MARINE REVIEW.

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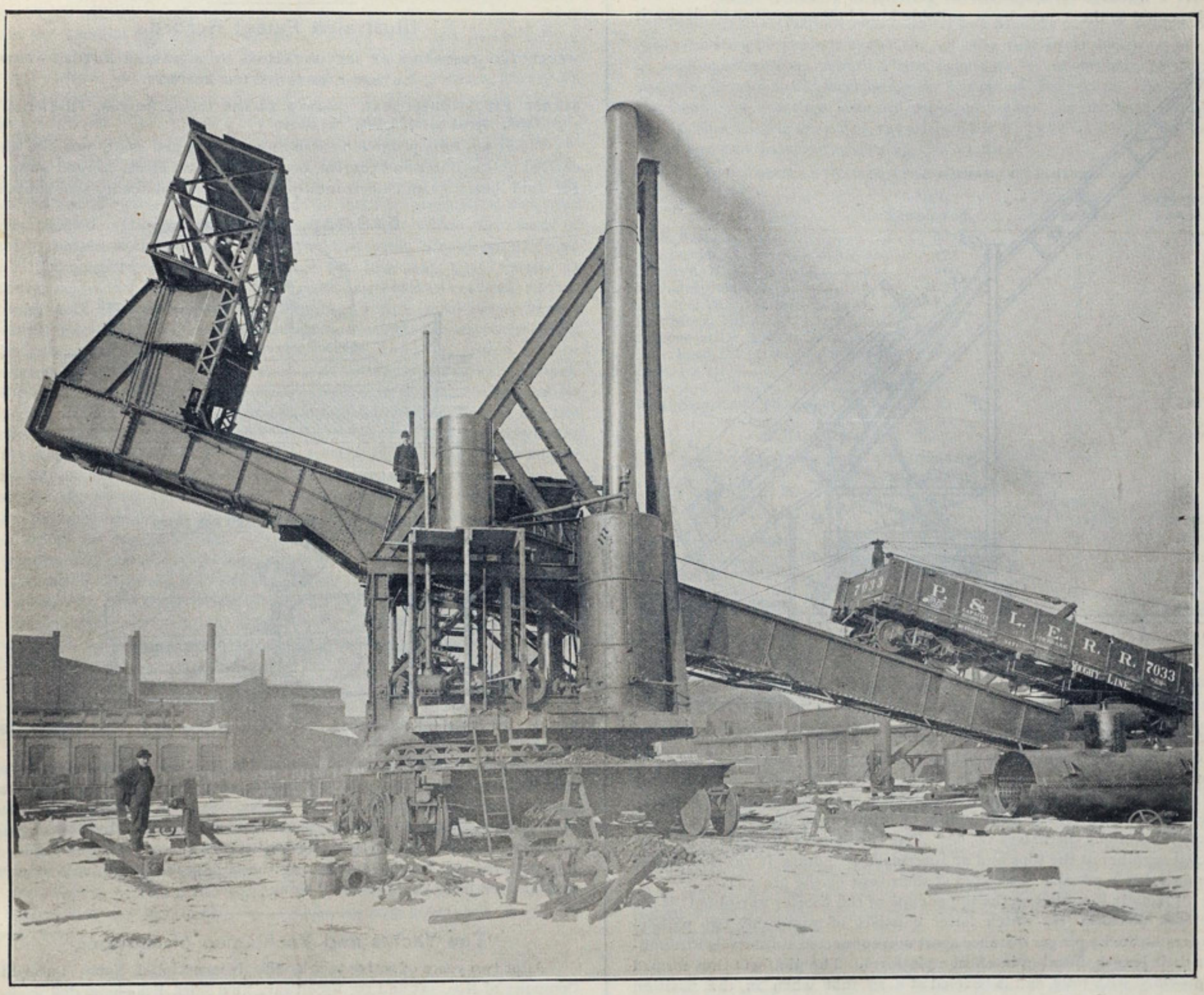
Rapid Method of Handling Soft Coal.

For some time past the McMyler Manufacturing Company of Cleveland, O., a concern that has been quite successful in the manufacture of hoisting and conveying machinery, especially rotary derricks for the loading of soft coal, has been working out the details of a machine to take up a railway car and dump into the hold of a vessel its load of twenty-five or more tons of coal. The system of high docks, pockets and chutes, by means of which cargoes of 2,000 to 3,000 tons of ore and anthracite coal are in two to five hours put in vessels at the ore shipping ports, and at Buffalo and Erie where hard coal is loaded, can not be applied to the soft coal business, on account of the great loss that would result from breakage in the coal, and as a result from a day and a half to two days is required with a rush of work to load cargoes of about 2,000 tons with large buckets and revolving derricks. A great problem has accordingly been involved in overcoming this detention and in reducing handling charges. The McMyler company in conjunction with Pickands, Mather & Co. of Cleveland, who are extensive shippers of soft coal at Ohio ports, have just made a trial at Ashtabula Harbor of the machine illustrated on these pages, and from the work accomplished in loading one of the steamboats of the Minnesota line last week, there is every reason to expect that the shoveling of coal from cars into buckets in the cargo trade will soon be a method of the past.

A hasty glance at the illustrations will give a general idea of the workings of the machine. The whole structure is built upon tracks running parallel to the vessel at the dock, while the cantilever upon which the car is taken up, is at right angles to the vessel, reaching at the discharge end into the hatch of the vessel and at the shore end to a system of tracks for loaded and unloaded cars. In the plant arranged for the first of these machines at Ashtabula there are six sets of tracks,one track for loaded and one for unloaded cars, correspnding as near as possible to distances between hatches in modern lake steamers. These tracks are inclined so as to make the movement of cars easy, and as they extend back for some distance from the machine they have capacity for ninety loaded cars, which at twenty-five tons each would aggregate 2,250 tons, or enough coal for the average cargo. With the shore end of the cantilever down a loaded car is drawn up by means of steam power and cables and the cantilever is tilted by hydraulic power. The end board of the car is automatically removed and with the cantilever reaching down into the hold of the vessel, the coal is dropped out; the cantilever is again tilted, the empty car is allowed to run down onto the track intended for "empties," a loaded car is again taken up and so the operation continues, the machine moving from one hatch to another as may be desired in order to permit of trimming.

One of the best features of this machine is its adaptability to the style of railway car in general use in the soft coal trade. The only change re-

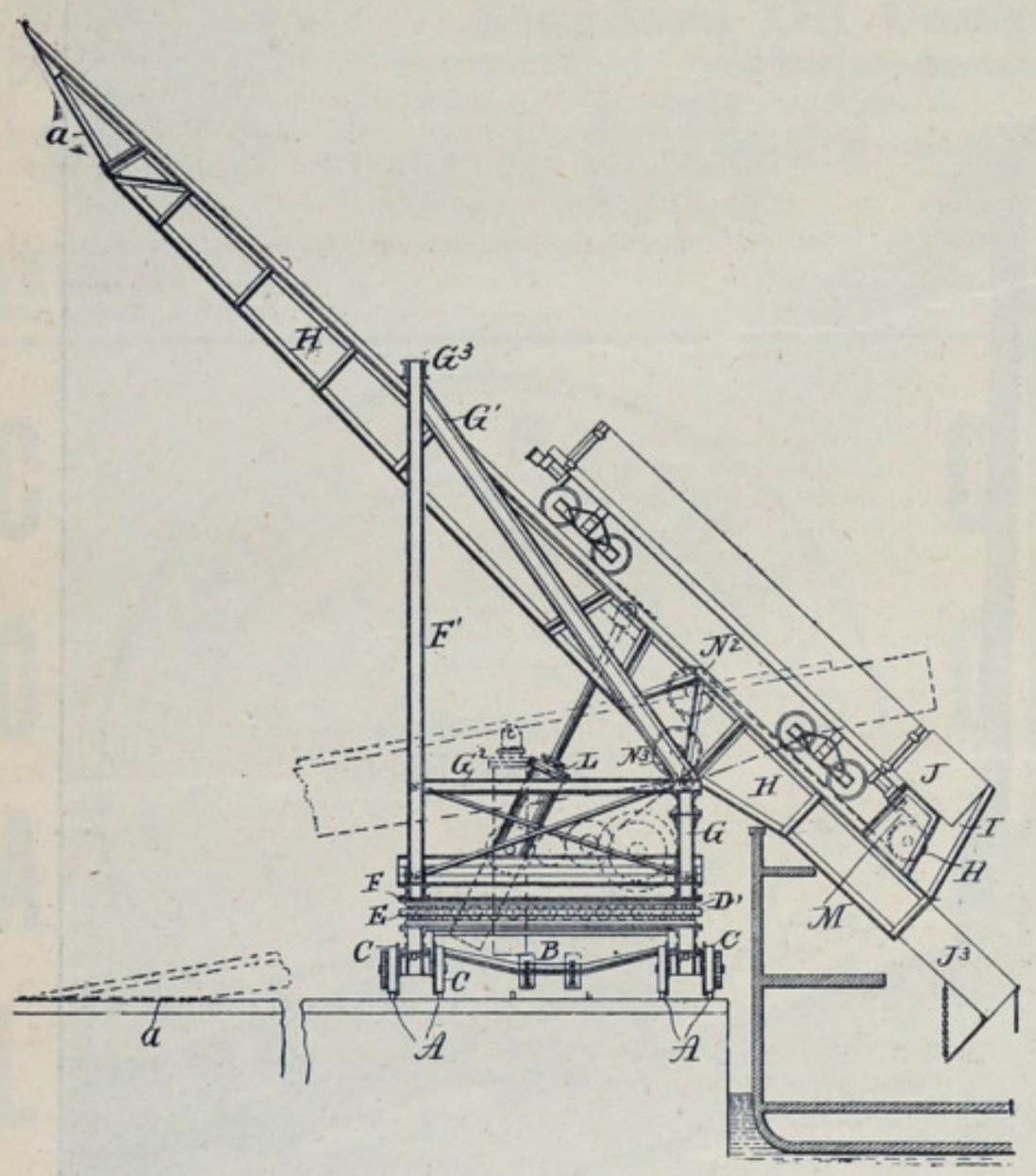


MACHINE FOR DUMPING COAL IN CAR LOADS INTO VESSELS.

quired in the cars is the fitting of sliding end boards at a very low cost. The L. S. & M. S. and P. & L. E. railways have already fitted 1,000 cars for this trade, and they have done so very readily, as the increased dispatch in handling coal will cause less delay with cars and result greatly to their advantage on that account. It is expected to operate this machine with five men, and if it can handle regularly a car in six minutes success is assured with it. At times during the loading of the first boat cars were handled in two and a half to four minutes.

The small drawing is taken from the specification accompanying letters patent on the machine, while the large engraving is from a photograph taken before it was put into operation at Ashtabula Harbor. For details regarding the different parts of the machine, the following is taken from the patent specification :

"A represents a railway constructed to receive the truck B, which latter is mounted on wheels C arranged in pairs, and is adapted to travel back and forth parallel to the pier or water front. The wheels C are as stated arranged in pairs, each pair constituting in effect a truck, the trucks so formed being pivotally connected to the main truck B,so as to enable the wheels to follow inequalities in the track without straining the parts. This truck B is provided on its upper face with a bearing or way for the rollers D which latter are carried by the ring E. Resting on the rollers D, and secured to the truck by a suitable king bolt or equivalent device is



the rotary platform F, which latter carries a suitable engine and boiler, or electric or other motors for actuating the drums and other movable parts. The platform is rotated by means of the rack and pinion ordinarily employed for that purpose, and is provided with the uprights F′ and G, the former being considerably longer or higher than the latter and connected thereto by the braces G′, G². The two shorter uprights G are coneected together at the tops and at intermediate points if desired, while the uprights F are also connected at their tops by the braces G³.

"Pivotally mounted on the upper ends of the shorter uprights G is the inclined platform H, which latter consists of preferably two parallel girders located a proper distance apart and connected at intervals throughout their length, forming in effect a platform. The platform thus formed is provided with rails, and is beveled at *a* so that when in the position shown in the dotted lines the beveled ends of the rails will rest on the rails of the surface track and form a continuation thereof, so that a car on the surface track can be drawn up the inclined platform, discharged of its contents and lowered onto the same or onto another track.

"The platform H is pivoted to one side of its longitudinal center and is provided at its outer or shorter end with a bumper or buffer I, and adjacent to the latter is the mouth of the discharging chute J. This chute J communicates with a telescopic trough or spout J³ carrying at its free end movable gates, which latter direct the coal or other contents of the car to any part of the hold or bin. These gates are actuated by ropes or chains under the control of the operator, whereby the discharge can be regulated both as to quantity and direction. After the car has been discharged of its load, the platform is tilted so as to carry the end thereof well out of the hold or bin, and the rotary platform is then turned so as to bring the beveled end of the tilting platform over a track onto which the empty cars are run. The platform is then lowered onto said track and the empty car lowered, after which the platform is turned to the track having the loaded cars thereon, and another one carried up and discharged, as described.

"L is a hydraulic cylinder pivotally or loosely mounted on the platform F and provided with a plunger, the free end of which is connected to the tilting platform as shown. By means of this plunger and suitable means for forcing water therein; the tilting platform can be raised from the position shown in dotted lines to the position shown in full lines. By permitting the water to escape from the hydraulic cylinder the opposite end of the platform is lowered onto the track. The platform H is provided with a sheave H′, around which passes chain M. The free end of this chain is adapted to be attached to the car coupler, while the opposite end thereof is secured to drum N after passing around sheaves N² N³. Thus when the platform is in the position shown in dotted lines, and the chain M attached to a car the rotation of the drum N which is actuated by a suitable motor causes the car to move up the incline until it comes in contact with the buffer. The drum is then locked against rotation, and the platform tilted.

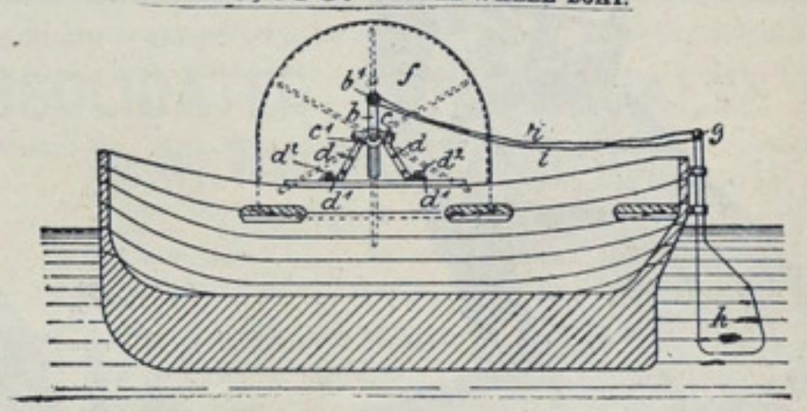
Illustrated Patent Record.

SELECTED ABSTRACTS OF SPECIFICATIONS OF A MARINE NATURE—FROM LATEST PATENT OFFICE REPORTS.

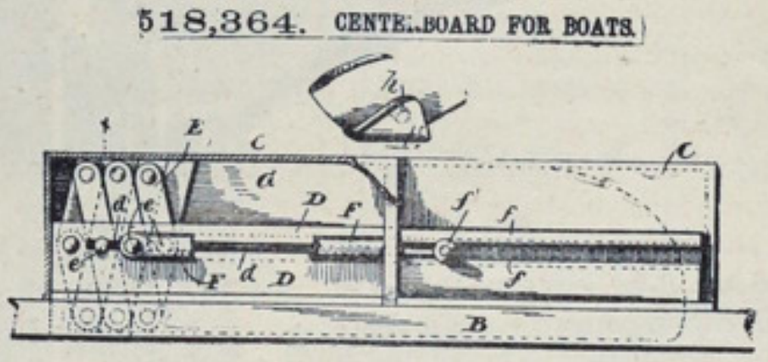
518,255 PADDLE-WHEEL BOAT. Johann S. Kunneth. Leipsic. Germany. Filed August 19, 1893. Serial No. 483,584. (No model).

Claim.—A boat propeller consisting of a cranked shaft, a paddle wheel carried on the outer end thereof, bearings for said shaft, hinged supports for said bearings and horizontally movable base plates for said supports.

518,255. PADDLE-WHEEL BOAT.



518,364. CENTE..BOARD FOR BOATS.



518,364 CENTERBOARD FOR BOATS. Joel Couch, Clayton, N. Y. Filed Oct. 18, 1893. Serial No. 488,531. (No model.)

Claim.—First, a folding center-board having the blades connected and operated by a lazy tongs, the latter having the center or middle pivots extended and adapted to work in guides. Second in a folding center-board, the combination with the blades, and a longitudinally slotted guide, of a lazy tongs connecting the said blades and pivoted to the guides in line with the slot therein,and having the middle or center pivots extended and adapted to work in the said slots.

"The Yachts and Yachtsmen of America."

After two years of active work, the International Yacht Publishing Company of Nos. 155 and 157 Broadway, New York, has succeeded in issuing the first volume of the "Yachts and Yachtsmen of America," a work that has been referred to several times in these columns and that is intended as a standard work of reference for yachtsmen. This volume contains 692 very large pages, and there is in addition a great number of full page engravings of yachts and club houses that are inserted and not counted in the numbering of the book. The publishers say they have already expended more than $50,000 on their undertaking. A work of its magnitude seems even too much for the yachting interests of this country. The first volume contains 940 engravings, and some of them are elegant, especially the full page photo-gravures of yachts and club houses, but it would seem that the latter have been buried in being distributed among hundreds of pages of reading matter throughout the big book.

Foreign Vessels Owned or Chartered by Americans.

Eugene F. Chamberlain, the Democratic commissioner of navigation, has been collecting some statistics that are evidently intended to have a bearing upon legislation of the kind that proposes to admit foreign vessels to American register if the purchasers or owners of such vessels are American citizens and will agree to build an equivalent in new tonnage in this country. A circular letter from the office of the commissioner says that replies from New York, Philadelphia, Boston, Baltimore, Portland, Me., Charleston, Savannah, New Orleans and Galveston have been received to inquiry concerning the extent to which American citizens during the past six months have participated in the ocean carrying trade to and from the United States as owners in whole or in part or as as charterers of vessels under foreign flags. Seventy-five replies show that Americans at these ports were interested as owners or charterers, chiefly the latter, in 567 different vessels of 804,355 tons, flying foreign flags. Of these, forty-three vessels of 85,613 tons, are owned by Americans. The registered American tonnage at these nine ports amounts to 648 vessels of 563,231 tons. Of the foreign vessels chartered or owned by Americans, 275 steamers of 517,321 tons were under the British flag. (The registered steam tonnage of the entire United States under the American flag amounts to 249 steamers of 261,102 tons.) Under the Norwegian flag, fifty steamers of 45,338 tons and twenty-nine sailing vessels of 21,632 tons were chartered or owned in part; under the Spanish flag, eight steamers of 16,255 tons and seven sailing vessels of 3,558 tons, and under the Italian flag, thirty-one sailing vessels of 20,163 tons. Very limited use has been made of German, French or Austrian vessels by American charterers. A full tabulation of the replies is given, but the totals and important features are noted in the foregoing.

Referring to the statistics Mr. Chamberlain says in a separate letter:

"On this subject, 200 circulars of inquiry were sent out and seventy-five replies have been received. Besides the nine ports named, San Francisco and Port Townsend were requested to furnish information, but have not yet replied. The statistics are incomplete even within the scope of inquiry, limited to the eleven large seaports, as some firms have made no reply. The registered American tonnage for 1893 was 1,343 vessels of 899,802 gross tons. Some of the terms were expressed in net tons, so that the aggregate gross tonnage of the tabulation would exeed the aggregate American registered tonnage. The returns, of course, do not include any of the great transatlantic passenger lines, the vessels of which are not chartered. No attempt has been made to ascertain the ownership of stock in these companies, but it is understood that the International Navigation Company, (American capital) owns and operates under the British flag the Berlin of 3,302 tons and the Chester of 2,944 tons, and has a large interest in the steamers of the Red Star line, under the Belgian flag, of an aggregate tonnage of about 18,000 tons. Full returns, if obtainable, would doubtless show that Americans own and operate under foreign flags a steam tonnage equal to or greater than one-half the steam tonnage registered under the American flag. It is understood that none of the vessels in the returns receive any subsidy, either directly or in the form of mail compensation, from any government. They are taken to be solely tools of commerce. The charters are of varying terms, some of the vessels being employed only for single voyages, others for several voyages from different ports, and others running regularly under charters covering one or two years. Generally speaking the statistics seem to show:

1st. That American capital is invested in the ocean carrying trade to a much greater extent than is indicated by the returns of registered American tonnage.

2nd. That while the laws forbid Americans to purchase outright vessels of foreign build—except wrecks repaired in this country—and operate them under the American flag with officers and crews of their own selection, Americans nevertheless are purchasing or chartering foreign vessels to meet the requirements of our foreign trade, and operating them under the British, Norwegian and Italian flags, with officers and crews presumably of those nationalities.

No effort to ascertain the number of men employed on the 567 vessels of 804,355 tons has been made, but a rough estimate is between 30,000 and 35,000 men.

Strong Freight Steamers.

The few steel freight boats that are now being built in lake ship yards are getting great care from builders and will embody many improvements, especially in hull construction,which have been prompted by the desire of both owners and builders to have very strong boats. Capt. E. M. Peck is understood to be more than pleased with the big steel steamer Harvey H. Brown, just completed by the Detroit Dry Dock Company. She was given a trial on the Detroit river, Saturday, and a constructing engineer who was aboard writes us as follows about the trip: "To say that Capt. Peck was pleased with his boat is putting it mildly. Mr. Brown can well be pleased to have such a ship named after him. The electric plant on the steamer is certainly a success. The search light was worked at the dock on Wednesday evening and we could see objects quite distinctly over to Windsor. The plant was put in by the F. P. Little company of Buffalo and the details were looked after in a most thorough manner. The engines were turned from eighty-five to ninety-two revolutions per minute, to test the steaming qualities of the Howden system of forced draft, and the safety valves were kept blowing no matter how hard we worked the engines. It was particularly noticeable that there was not the least vibration to the ship, no matter at what speed the engines were worked. A number of representative Detroit vessel owners were aboard and it was regretted that Mr. Brown was not one of the party to hear the complimentary remarks about his namesake. Capt. Edward Gatfield had charge of the ship for the Dry Dock company and Mr. C. B. Calder, superintendent of the Dry Dock Engine Works, was in charge of the machinery. Capt. Gatfield will sail the boat and John Hand will be chief engineer."

Another steel freight steamer that will compare with the strongest boats as yet constructed on the lakes is the ship that was begun on builders' account by the Globe Iron Works Company some time ago. On account of the interest that has attached to the completion of the first of the Northern Line ships, this steamer has not attracted attention outside of the ship yard, but we hope to give some details about her in a future issue that will prove interesting.

Steel Vessels Building in the United States.

Following is a statement of number and tonnage of steel vessels now under construction or contracted for, and the number of hands employed on such construction, compiled from responses of twenty-one establishments to inquiry made recently by the bureau of navigation, treasury department. No vessels of iron are reported under construction, and no steel sailing vessels are noted, the Dirigo, the first steel ship, having been completed and documented during this inquiry:

STEEL STEAMERS FOR MERCHANT SERVICE.

	Men Employed.	Number of Vessels.	Registered Tonnage.
Bath, Me	800*	2	3,600
Newburgh, N. Y	175	1	300
Camden, N. J	200	2	775
Philadelphia, Pa	5,775*	9	25,400
Chester, Pa	650	2	5,796
Baltimore, Md	75	1	100
Jeffersonville, Ind	100	2	1,200
Cleveland, O	650	7	12,950
Chicago, Ill	250	1	3,000
Detroit, Mich	100	1	2,164
West Superior, Wis	100	1	1,715
Total	8,875	29	57,000

* 5,400 of these employed also on vessels for the navy.

STEEL STEAM WAR VESSELS.

	Men Employed.	Number of Vessels.	Displacement.
San Francisco, Cal	1,200	2	10,000
Bath, Me	800*	1	2,000
Newport News, Va	800	3	4,700
Sparrows Point, Md	75	1	2,000
Philadelphia Pa	5,400*	6	56,000
Total	8,275	13	80,700

* Employed also on vessels for merchant service.

In his annual report (page 20), the secretary of the navy reports twenty steel war vessels, 115,345 tons displacement, under construction, but the summary of replies noted above does not include government navy yards.

The eleventh census reports twenty-one establishments engaged in building iron and steel vessels, with $33,900,148 capital and 10,767 employes, receiving $6,579,063 wages, and a product for the census year of 101 vessels of 148,929 tons, valued at $13,256,703. It is understood that the firm of Wm. Cramp & Sons, Philadelphia, is not included in this report. In the statistics of the bureau of navigation given above this establishment reports the employment of 5,400 men, and a construction of 21,400 registered tons for the merchant service, and 56,000 tons displacement for the United States navy.

Stocks of Grain at Lake Ports.

The following table, prepared from reports of the Chicago board of trade, shows the stocks of wheat and corn in store at the principal points of accumulation on the lakes on April 21, 1894:

	Wheat, bu.	Corn, bu.
Chicago	20,404,000	5,159,000
Duluth	11,880,000	261,000
Milwaukee	939,000	3,000
Detroit	2,021,000	54,000
Toledo	3,058,000	600,000
Buffalo	2,002,000	1,345,000
Total	40,304,000	7,422,000

At the points named there is a net increase for the week of 864,000 bushels of wheat and a net decrease of 721,000 bushels of corn.

Buffalo Elevator Charges.

A SUMMARY OF THE IMPORTANT POINTS IN DISPUTE—THE STATE LAW ON THE SUBJECT—PRECEDENTS ESTABLISHED.

The differences existing between elevator owners and vessel owners regarding charges for shoveling grain, have been adjusted and settled to the satisfaction of both sides. The dispute arose out of the fact that the elevators charged, and for a long time had continued to charge, 50 cents a thousand bushels more for shoveling in steam vessels than they did in sail vessels. When this distinction was first made there was reason for it. The sail vessel was the standard grain carrier. The steamers were not well arranged for carrying grain; hatches were few in number and of small size, and the holds were divided in compartments by bulkheads, and, as will be readily appreciated, a great deal more labor was required to unload a steamer, and a greater charge was proper. Now the steambarge is the standard grain carrier. The average size of the steamer is much larger than the sailing vessel. The hold is not divided into compartments. There are plenty of large hatches, extending across the steamers for almost their entire width; and they are unloaded as easily as sail vessels, or with even less labor, because the steam power is used in shifting the steamer while unloading.

Notwithstanding the change in the character of the steam grain carriers, the elevators continued to charge 50 cents per thousand above the price of shoveling sailing vessels. At the meeting of the Lake Carriers' Association, held at Detroit last winter, a committee was appointed to advise with the elevator men and secure a uniform rate for unloading steam and sail vessels. The committee met the elevater men and were referred to the Shovelers' Union, the elevator people claiming that they had nothing to do with the shoveling charges; that those charges were fixed by the Shovelers' Union. The shoveling charges have been at the rate of $4 per thousand for sailing vessels and $4.50 a thousand for steam vessels. The bills were made out in the name of the boss shoveler, but all payments were made direct to the elevator. The elevators claim that the shovelers are not hired by them; that the vessel hires the men. There is a so-called boss shoveler at each elevator, who is supposed to furnish the men, collect the charges and distribute the money among the men, retaining for himself the same share that the others get. When the steam shovels are used the elevator charges the scoopers $1.75 per thousand as rent for the use of the shovel, for steamers, and $1.50 for sailing vessels.

The patents on the steam shovel have expired. During the life of the patents the vessels were compelled to pay an additonal 50 cents per thousand as royalty; but, of course, this is now saved.

The Lake Carriers' committee met the executive committee of the Shovelers' Union and stated their case. They were politely, but firmly, told that the Shovelers' Union would make no reduction of any kind. The elevator interests thought that this would end the matter, but it was not so. The Shovelers' Union at Buffalo is one of the strongest labor organizations in the country. At a meeting of Cleveland vessel owners in the latter part of March, the subject was brought up again. It was decided that the matter should not be allowed to rest, and the vessel men pledged sufficient money to carry on the fight. They directed Brown & Co., vessel agents of Buffalo, to employ counsel and bring suits at law or take such other action as they deemed best, to obtain a reduction of shoveling charges. Brown & Co. retained as counsel Harvey D. Goulder, admiralty lawyer of Cleveland, and their attorney, Harvey L. Brown.

In 1888 a bill known as the elevator act was passed by the legislature of the state of New York, regulating the charges for elevating grain in the state. The following is a copy of the bill:

Chapter 581, laws of 1888.—An act to regulate the fees and charges for elevating, trimming, receiving, weighing and discharging grain by means of floating and stationary elevators and warehouses in this state. Approved by the governor June 9th, 1888. The people of the state of New York, represented in senate and assembly, do enact as follows:

SECTION 1. The maximum charge for elevating, receiving, weighing and discharging grain by means of floating and stationary elevators and warehouses in this state shall not exceed the following rates, namely: For elevating, receiving, weighing and discharging grain, five-eights of one cent a bushel. In the process of handling grain by means of floating and stationary elevators, the lake vessels or propellers, the ocean vessels or steamships and canal boats, shall only be required to pay the actual cost of trimming or shoveling to the leg of the elevator when unloading, and trimming cargo when loading.

SEC. 2. Any person or persons violating the provision of this act shall upon conviction thereof, be adjudged guilty of a misdemeanor, and be punished by a fine not less than $250 and costs thereof.

SEC. 3. Any person injured by the violation of the provisions of this act may sue for and recover any damage he may sustain against any person or persons violating said provisions.

SEC. 4. This act shall not apply to any village, town or city having less than 130,000 population.

This bill has been very thoroughly discussed in the courts. Soon after its passage one of the elevator managers was indicted by a grand jury of Erie county and tried before Judge Titus and a jury at a criminal term of the superior court of Buffalo for a misdemeanor in violating the provisions of the act. The defendant, whose name was Budd, was convicted of the offense charged and sentenced to pay a fine of $250. The defendant, for the purpose of testing the constitutionality of the act, appealed to the general term of the superior court; from there to the court of appeals and thence to the supreme court of the United States. The judgment of the trial court was sustained in each instance. The court of appeals and the supreme court of the United States discussed the question of shoveling charges in the manner set forth in the following qoutation, which is a part of the opinion of the court of appeals, delivered by Judge Andrews, in October, 1889.

"The defendant, the manager of a stationary elevator in the city of Buffalo, on the 19th day of September, 1888, exacted from the Lehigh Valley Transportation Company for elevating, raising and discharging a cargo of corn from a lake propeller at his elevator, the sum of one cent a bushel, and for shoveling to the leg of the elevator, the carrier was charged and compelled to pay $4 for each thousand bushels. The shoveling of grain to the leg of an elevator at the port of Buffalo is now performed pursuant to an arrangement made since the passage of the act of 1888, by a body of men known as the Shovelers' Union, who pay the elevators $1.75 a thousand bushels for use of the steam shovel, a part of the machinery connected with the elevator, operated by steam, and who for their services and the expense of the steam shovel charge the carrier for each thousand bushels of grain shoveled the sum of $4. The defendant was indicted for a violation of the act of 1888. The indictment contains a single count charging a violation of the first section in two particulars, viz: In enacting more than the statute rate for elevating the cargo and exacting more than the actual cost for shoveling the grain to the leg of the elevator. Before reaching the main question there is a subordinate question to be considered. The defendent on the trial raised the question of the constitutionality of the act of 1888, and also insisted that, as to the alleged overcharge for shoveling, the facts did not show that the defendant had received anything for that service or that the cargo had been charged more than the actual cost, and excepted to the submission to the jury of that branch of the case. The trial judge overruled both points and submitted the case to the jury in both aspects, who found a general verdict of guilty, and therefore the court imposed upon the defendant a fine of $250. It is now urged that, assuming the constitutionality of the act of 1888, the judgment should be reversed, for the reason that no overcharge by the defendant for shoveling was proved, and also that the sum paid for shoveling was paid to the Shovelers' Union, the defendant only receiving thereout, from the union, the rent agreed for the use of the steam shovel. There are two answers to this proposition. The words 'actual cost,' used in the statute, were manifestly intended to exclude any charge by the elevators beyond the sum specified for the use of its machinery in shoveling, and the ordinary expenses of operating it, and to confine the charge to the actual cost of the outside labor required for trimming and bringing the grain to the leg of the elevator. The purpose of the act could be easily evaded and defeated if the elevator owners were permitted to separate the services, and charge for the use of the steam shovel any sum which might be agreed upon between themselves and the Shovelers' Union, and thereby, under color of charging for the use of the steam shovel, exact of the carrier a sum for elevating beyond the rate fixed by the act."

It appears from the decision quoted that, under the act of 1888, the elevators are not entitled to any rent or charge for the use of the steam shovels. They have, notwithstanding the decision quoted, charged the scoopers $1.75 per thousand for the use of the steam shovels ever since the bill was passed. Several millions of dollars have been collected by the elevators in this way It was advised that, as this money had been paid without protest, it was doubtful whether it could be recovered. It was intended, however, if the elevator men had remained obdurate, to bring suits to test this question. When navigation opened this season and vessels were ready to unload, Brown & Co. served notices on the elevators, protesting against any charge being made for the use of the steam shovels, on the ground that it was in violation of the statutes of the state of New York. They also notified the boss shovelers that they protested against all that part of their charges made, or to be made, for the use of the steam shovels. The result was that when vessels went to unload, the shoveling was all done by hand, the elevators claiming that the shovels were not in working order. Next, the boss shovelers presented printed contracts for the masters to sign. These were simple contracts between the boss shoveler and the vessel for shoveling at $4.50 per thousand for steamers and $4.co for sailing vessels, with a rebate of 50 cents per thousand if steam shovels were used. It was further provided in these contracts that no person or corporation other than those signing the agreement were in any manner interested therein. If the elevators were not interested, this clause would have been superfluous, and its insertion seems to be an admission on the part of the elevators. Brown & Co. caused notices to be served on the boss scooper, requiring that he demand of the elevator the use of the steam shovel, and on the elevators, protest-

ing against the non-use of the shovels, and notifying the elevators that they would be held liable for the excess of cost of shoveling caused by failure to furnish use of steam shovels. The shoveling bills were thereafter paid directly to the boss shoveler for a short time. Then the elevators caused John M. Bedford, an elevator man, to be appointed attorney, in fact, for the scoopers to collect shoveling charges, showing that the elevators were hit again.

The committee of vessel men, consisting of M. M. Drake, James McKenzie and J. J. H. Brown, decided that suits should be brought to recover the excessive charges paid under protest, but the elevators carefully avoided litigation. The schooner J. I. Case was unloaded at the Cyclone elevator. The freight was collected and a warehouse receipt obtained without paying the shovelers' bill, which included, of course, a charge for the use of the steam shovel. For the purpose of compelling the elevator, or the boss scooper to bring suit, so that the questions in dispute could be raised, the bill for shoveling was not paid. No suit was brought, however. Finally the elevator men met the members of the vessel owners' committee and discussed the differences between them After several meetings the elevator people proposed to compromise by reducing the charge for the use of the steam shovel 25 cents per thousand in the case of steam vessels. It was also agreed that they should try to get the scoopers to throw off an additional 25 cents. The scoopers have not yet acceded to this demand. However, the compromise was agreed upon and the dispute settled.

More Complications in the Freight Situation.

As the sales of iron ore and the plans of furnace owners interested in Lake Superior mines already provide, to a certainty, for the movement of very close to 5,000,000 tons by lake during the present season, and as ore dealers have been in the market during the past few days for vessels to make single trips from the head of Lake Superior at 80 cents, it would seem that from this time on the shippers will try to insist, as far as possible, upon vessel owners beginning work on their contracts, but the general strike of soft coal miners has rendered the freight situation even more complicated than it has been since the Straits were opened three weeks ago. Added to the great disadvantage of being unable to secure coal cargoes to partially help out on the low ore freights, there is now every indication of a shortage of coal to be used as fuel for steam vessels, and a consequent additional cause for a suspensisn of operations, even among vessels that have contracts on which they might be running up the lakes without cargoes. Railways at lower lake ports are reserving fo- their own use all the coal they can possibly hold, and two weeks more of idleness in the mines will be the means of cleaning up supplies at fueling points in and around Detroit and along the rivers. One large owner in Cleveland has been quietly filling up his vessels with fuel for several days past, with a view to taking advantage of the fuel famine if it comes, although he has no charters for the boats and has had no thought of sending them out, and owners generally have been making provisions in the same direction wherever they have found it convenient to do so. A continuance of the coal strike for even ten days will make the fuel question an important factor in the general freight situation and will delay and movement of cargo coal until the first of June, but as one vessel owner puts it, it will prevent some managers of vessels from committing financial suicide by continuing the acceptance of such coal freights as have been offered up to this time. The enforced idleness brought on by these unusual conditions in the coal business is, however, accepted with good grace by most owners, on account of the shortening of the season that will result from it. Only one transaction of any consequence in freights on soft coal has been closed during the week. A Cleveland firm covered 30,000 tons to go to Milwaukee at 35 cents. The names of the boats have not been made public, but they must be secured by some business in Escanaba ore when taking coal for Lake Michigan at such a low figure. It is not intended, of course, to move any of this coal until after the mining troubles are settled.

There is improvement worth noting in the volume of business in iron and steel, as may be judged from the amount of ore that has been covered by the low lake freights since the first contracts were made some time ago. Sales of pig iron in Pittsburg and the Mahoning valley have been quite heavy during the past two weeks, and furnace owners are now adverse to making sales for future delivery at the low prices that have prevailed for some time past. In structural iron and steel an advance of about $2 a ton is recorded. Thus it may be said that if it were not for the disadvantages encountered in the coal business, vessels would find considerable to do in the trade between Ohio ports and the upper lakes, though the rates are low. Advices from both Duluth and Chicago are to the effect that those who are best posted in the grain business are unable to express an opinion as to when any part of the large stocks held in store may be moved in quantities sufficient to have an effect on the freight market.

The big tow of vessels owned by Valentine Fries of Milan, O.—steamer Edwards and consorts Golden Age and Foster—have been laid up at Huron, and M. A. Bradley of Cleveland, who controls the largest single fleet of vessels on the lakes, says he will not move a single cargo on which the freight does not show a margin of profit over operating expenses. As evidence of this intention, he has laid up at Ashtabula the steamer Alva, after arriving down from Chicago, and this boat, which might be chartered to go light for 80-cent ore, can carry ore at such a figure about as well as any boat on the lakes.

Pumps for Vessels of War.

Probably the largest order for steam pumps ever given out in this country by one concern was awarded to the Geo. F. Blake Manufacturing Company by the Wm. Cramp and Sons Ship and Engine Building Company, for a complete outfit of pumps for the United States cruisers New York and Columbia and the battleships Indiana and Massachusetts. The contract covered over one hundred steam pumps of all kinds, including independent air pumps for the main condensers, hydraulic pressure pumps for operating the guns, main and auxiliary feed pumps, main and auxiliary fire pumps, wrecking pumps, bilge pumps, water service pumps, engine room oil pumps, drainage pumps and steam pumps for steam launches. Since the receipt of this order the Blake company has also closed a contract with the Cramp company for a similar supply of pumps for the cruisers Minneapolis and Brooklyn and the battleship Iowa.

Around the Lakes.

Henry F. McGinness, who was among the best known marine engineers on the lakes, died at his home in Cleveland Tuesday. He was fifty-two years of age.

The new passenger boat, for which the Goodrich Transportation Company of Chicago is having plans prepared, is to be a side-wheel steamer of about 220 feet over all, 60 feet beam over guards and 12½ feet depth of hold.

Mr. Stewart Murray has been appointed general freight agent of the Northern Steamship Company and W. J. Stewart auditor of the company. Both appointments took effect on Monday last and both will have offices at 60 Main street, Buffalo.

Officers of the Chicago board of underwriters elected for the ensuing year are: President, W. M. Egan; vice president, Calvin Carr; secretary and treasurer, James R. Kellog; executive committee. Hugh McMillan, J. C. Evans, J. J. Rardon.

With several inches more water at the St. Mary's Falls canal at the opening of the season than was available a year ago, there is every prospect of large cargoes being carried from Lake Superior for some time to come, as the water continues to rise during the summer months.

A first class repair shop at the Sault will be appreciated by owners, captains and engineers. James Lawrie, a mechanical engieeer of experience, announces that he has leased the Soo City Machine and Boiler Works al Sault Ste. Marie, Mich., and has a full force of first-class mechanics. Works are on Union dock.

Notice is given that about May 4 the two fixed red electric lights marking the range for entering the head of the St. Clair river, exhibited from the structures erected on the west bank of the river, near the Grand Trunk Railway freight house and dock, Fort Gratiot, Mich., will be discontinued and a fixed red lens-lantern light substituted for each.

Charles A. Richardson of the firm of Chittenden and Richardson, vessel brokers at Chicago, has been appointed to succeed Capt. C. H. Sinclair as local inspector of hulls at Chicago. Ex-Mayor Cregier of Chicago is a prominent candidate for the office of supervising inspector in the eighth district, to succeed Capt. C. H. Westcott, who has been asked to resign.

With all principal channels and ports on the lakes, excepting probably Port Arthur and Fort William, now open to navigation, it may be well to note for reference purposes that in 1894 the Straits of Mackinaw opened on April 2; St Mary's Falls canal, April 17; Duluth and Superior, April 19; Welland canal, April 19, and Erie canal (according to orders), May 1.

About 700,000 bushels of grain afloat at Duluth will move down to Buffalo immediately, but there are no indications of the eleven millions or more in store being moved for some to come, on account of the light foreign demand and the slight margin between prices in the eastern and western markets. This is one of the drawbacks in the freight market.

We have recently received a copy of a pamphlet issued from the London office of the Worthington Pumping Engine Company, which contains an article by Otto H. Mueller, civil engineer of Buda Pesth, on the "Advantages of Independent Auxiliary Pumps." The article was originally printed in Engineering of London and sets forth in a very satisfactory way the advantages of independent auxiliary pumps. The author theorises on the very lines that the house of Henry R. Worthington has worked out in so satisfactory a way in its practice on the lakes.

IF YOU SEND $1 TO THE MARINE REVIEW, 516 PERRY-PAYNE BUILDING, CLEVELAND, O., FOR FOUR STEEL ENGRAVINGS OF U. S. WAR SHIPS, ON HEAVY CARD, AND ARE NOT SATISFIED WITH THEM, WE WILL REFUND THE MONEY.

MARINE REVIEW.

DEVOTED TO THE LAKE MARINE AND KINDRED INTERESTS.

Published every Thursday at No. 516 Perry-Payne building, Cleveland, O.
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The books of the United States treasury department contain the names of 3,761 vessels, of 1,261,067.22 gross tons register in the lake trade. The lakes have more steam vessels of 1,000 to 2,500 tons than the combined ownership of this class of vessels in all other sections of the country. The number of steam vessels of 1,000 to 2,500 tons on the lakes on June 30, 1893, was 318 and their aggregate gross tonnage 525,778.57; in all other parts of the country the number of this class of vessels was, on the same date, 211 and their gross tonnage 314,016.65. The classification of the entire lake fleet on June 30, 1893, was as follows:

Class.	Number.	Gross. Tonnage.
Steam vessels	1,731	828,702.29
Sailing vessels	1,205	317,789.37
Canal boats	743	76,843.57
Barges	82	37,731.99
Total	3,761	1,261,067.22

The gross registered tonnage of vessels built on the lakes during the past five years, according to the reports of the United States commissioner of navigation, is as follows:

	Number.	Net Tonnage.
1889	225	107,080.30
1890	218	108,515.00
1891	204	111,856.45
1892	169	45,168.98
1893	175	99,271.24
Total	991	471,891.97

Entered at Cleveland Post Office as Second-class Mail Matter.

VESSEL owners will do well to in all cases secure the form of bill of lading adopted at the last annual meeting of the Lake Carriers' Association when carrying grain cargoes. This new form of bill differs from the old one in two important particulars. One clause provides that "delivery to the party in whose care the same is marked shall be a good delivery, unless the original bill of lading is presented to the master and different delivery demanded in writing by the holder before the vessel begins unloading." Another clause provides that delivery shall be made only at storage elevators accessible by grain laden vessels of usual size and draft at port of delivery, unless otherwise specially agreed. There are many advantages to the vessel in the storage elevator as compared with the floating elevator. If the cargo is discharged at a storage elevator, the vessel may unload any time after arriving alongside of the elevator without regard to whether there are canal boats ready to receive the cargo or not. Then, too, it frequently happens that a safe and proper delivery can not be made of the cargo until the original bill of lading is taken up. Sometimes that original bill of lading is held by a New York or Chicago bank and it would take two or three days to get it to Buffalo, and if the vessel was to unload at a floating elevator, she would have to wait until the bill of lading could be produced, whereas if discharged at a storage elevator the vessel still has possession of the cargo and can unload with safety and without losing time.

A SUMMARY of matters entering into the fight made by the Lake Carriers's Association against excessive grain shoveling charges at Buffa'o appears elsewhere in this issue. Of all the struggles that the vessel owners have had this spring in adjusting handling charges to correspond with reduced freights the one at Buffalo has been most trying. The elevators have reduced the charge for steam shovels on steam vessels 25 cents per thousand bushels and a similar reduction is expected from the Shovelers' Union. The latter are obstinate, however, and there is some uncertainty about their action, but the vessel owners have proven the fairness of the position they have taken and the matter is not yet at an end.

AS YET the raft towing interests have made no public objection to the regulations for raft towing on the lakes, contained in the river and harbor bill recently reported to congress. It is to be hoped that no objection will be made to these regulations, as they are the outcome of a careful investigation of the raft towing question by army engineers, but if any fight is made on this feature of the bill the vessel owners should defend it to their utmost, as the subject is now in such shape as to give them every advantage, and defeat at this time would result in increased annoyance through rafts of all kinds being floated in all parts of the lakes probably for several years more without restriction of any kind.

MOST vessel owners and shippers of iron ore and coal are expecting a break in insurance rates for both hulls and cargoes and are shaping their business accordingly. Underwriters' agents are telling their customers that they will get the benefit of any cut that may be made, and there is a general air about the business that indicates a crash, on account of the delay in placing insurance and the competition for risks that will be reduced in volume as a result of the low range of freights. There will be little sympathy for the underwriters if the break does come, as they made tariffs for this season fully equal to those of past seasons, although reductions in all other lines of the lake trade amount to 10 to 25 per cent.

A DOZEN years ago there were over twenty old incorporated marine insurance companies in New England and New York. Today there is but one American marine insurance company in the great city of New York. The change has been caused largely through the aggression of English underwriters. These same foreigners have within a few years skimmed for themselves the cream of lake business. Evidently there is something wrong in the American system of doing business, and worst of all there is a great deal of truth in the statement repeatedly made, that commerce is as dependent upon marine insurance as it is upon banks, and that a greater American commerce can not come without insurance interests.

CONGRESSMAN Van Voorhis and the members of commercial bodies in Ohio cities distant from Lake Erie are engaged in a waste of time talking about a canal for the largest lake ships from Lake Erie to the Ohio river. To those acquainted with lake business there is about as much merit in this scheme from a practical standpoint as there was in the visionary brain of an English promoter of enterprises, who, when people of his kind were numerous on this side, proposed to establish a pipe line from the principal dairy district of New York state to New York city, for the purpose of pumping milk to the very doors of the consumers in the metropolis.

IN PREPARING for action in the senate on the river and harbor bill, Senator Allen has secured the passage of a resolution directing the secretary of the treasury to inform the senate of the amount of appropriations made by the government for the improvement of rivers and harbors from the first day of January, 1865, to the present date, specifying the different rivers and harbors in which improvemants have been made and the amounts expended therefor, respectively. This information, furnished in the form of an official report to the senate, will make a most valuable and useful document for the shipping interests.

Suez and St. Mary's Falls Canal Traffic.

Again in 1893 the tonnage of vessels passing through the St. Mary's Falls canal, which connects Lakes Michigan and Superior, is more than two millions greater, in a season of 219 days than the tonnage of the great Suez canal for the full calendar year. Statistics of both canals for a period of twenty-five years appear below. The Suez canal figures are from records in the London office and the St. Mary's Falls canal figures are those of the war department prepared under the direction of Gen. Poe.

SUEZ CANAL.			ST. MARY'S FALLS CANAL.		
Year.	Number of vessels.	Net regist'd tons.	Year.	Number of vessels.	Net regist'd tons.
1869	10	6,576	1869	1,338	524,885
1870	486	436,609	1870	1,828	690,826
1871	765	761,467	1871	1,637	752,101
1872	1,082	1,160,743	1872	2,004	914,735
1873	1,173	1,367,767	1873	2,517	1,204,446
1874	1,264	1,631,650	1874	1,734	1,070,857
1875	1,494	2,009,984	1875	2,033	1,259,534
1876	1,467	2,096,771	1876	2,417	1,541,676
1877	1,663	2,355,447	1877	2,451	1,439,216
1878	1,593	2,269,678	1878	2,516	1,667,136
1879	1,477	2,263,332	1879	3,121	1,677,071
1880	2,026	3,057,421	1880	3,503	1,734,890
1881	2,727	4,136,779	1881	4,004	2,092,757
1882	3,198	5,074,808	1882	4,774	2,468,088
1883	3,307	5,775,861	1883	4,315	2,042,259
1884	3,284	5,871,500	1884	5,689	2,997,837
1885	3,624	6,335,752	1885	5,380	3,035,937
1886	3,100	5,767,655	1886	7,424	4,219,397
1887	3,137	5,903,024	1887	9,355	4,897,598
1888	3,440	6,640,834	1888	7,803	5,130,659
1889	3,425	6,783,187	1889	9,579	7,221,935
1890	3,389	6,890,014	1890	10,557	8,454,435
1891	4,207	8,698,777	1891	10,191	8,400,685
1892	3,559	7,712,028	1892	12,580	10,647,203
1893	3,341	7,659,068	1893	12,008	9,849,754

"ROPER'S LAND AND MARINE ENGINES," BOUND IN MOROCCO WITH FLAP AND POCKET, WILL BE MAILED TO ANY ADDRESS FOR $3.50 SENT TO THE MARINE REVIEW, CLEVELAND, O.

Auxiliary Machinery of a Modern Cruiser.*

PARTICULARS OF A RECENT ADDITION TO THE UNITED STATES NAVY.

While there is some difference in the amount and arrangement of auxiliary machinery in cruisers of the same class, the description of one will suffice for the whole class, and I have chosen for this sketch a cruiser, which, through her wonderful speed performance a short time ago, is well known to everybody—the protected cruiser Columbia—the greatest triumph for our navy department, and for her builders, William Cramp & Sons Ship and Engine Building Company. It is astonishing what a number of different steam engines it takes to run one of these great ships, although they have a crew of a number that would seem sufficient to handle almost anything, yet there is such a variety of work to be performed constantly, that modern practice is to depend on the crew mainly for the fighting part of the business and to feed and regulate that mass of machinery which makes the ship inhabitable and gives it motion. To lift the heavy anchors, to hoist shot and shell and to lift the ashes from the depths of the stokehold, would be too slow a process if done by hand and speed is now the motto. The systems of draining and pumping to keep the ships free from water, to feed the boilers and supply water for various purposes to different parts of the ships, and the electric lighting and ventilation must to a great extent be duplicated, so that no ordinary breakdown will disable the interior workings of the ships. Let us make a trip through the ship. Commencing down in the engine rooms we find first some parasites to the three colossal main engines (42″, 59″ and 92″ by 42″ stroke). One, the turning engine, consists of two vertical single cylinder engines 8″ diameter and 6″ stroke. They have a common shaft with a worm in the middle, while through gearing turns the main shaft to a suitable position for starting. Another one is the reversing engine, a single upright cylinder 16″ by 22″. This has on top a hydraulic controlling cylinder, which can be used in case of breakdown but which in ordinary running serves as an excellent guide for the piston rod which acts through a lever on the high pressure valve liners. Independent of the main engine stands in each of the three engine rooms one air pump connected to the respective condensers. They are known as Blake's vertical "twin" air pumps, each having two steam cylinders 16″ diameter, two air cylinders 31½″ diameter, 21″ stroke. They work slowly and steadily, about 16 double strokes per minute, and are remarkably economical, as they require only about ¼ of 1 per cent. of the total horse power; they are very reliable and need very little attention. Then in each engine room are two circulating pumps for forcing cold water through the condenser and also for discharging bilge water directly overboard. They are centrifugal pumps, each driven by a vertical single cylinder engine, but they go in pairs and rest on the same bedplate. The pair can drive 14,000 gallons or 54 tons of water per minute through the condenser tubes, or pumps out the bilge at that rate in case of a leak. These pumps as well as the turning and reversing engines are furnished by the builders.

At the outside bulkhead in each engine room is a double horizontal Blake pump. A fire, feed and bilge pump with 12″ steam cylinder, 8½″ water cylinder and 12″ stroke. These pumps connect with the feedwater tanks for feeding the boilers, with sea valves for pumping water into the fire main, also through valve boxes with the different drains for discharging bilge water overboard. Each engine room has hanging on the dividing transverse bulkhead a Blake duplex vertical fire and bilge pump. Those in the forward engine rooms are 12″ by 7⅛″ by 12″, and in the after one 14″ by 9″ by 12″. Their purpose is also to supply the fire main from the sea and to discharge outboard from valve box connections with main and secondary drains, bilge and water bottom suctions. There are also on the same bulkhead three sets of pumps of the same make as the former, but much smaller, having 7½″ steam, 4½″ water cylinder and 10″ stroke. They are called water service pumps, for their duty is to furnish a cold shower to the main journals, thrust bearings and other parts likely to be heated by running. They also supply the fire service. In the after engine room is a Sturtevant blower or ventilating fan, 36″ diameter and 17″ wide, driven by a 3½″ by 2½″ double enclosed engine of about 4 I.H.P. It will exhaust 8,000 cubic feet of air per minute at 600 revolutions. Overhead in the two forward engine rooms, right under the armor grating and nearly covered from sight by twisted masses of pipe, hangs two Wheeler auxiliary condensers, really condensers for auxiliary machinery. They are nine feet long and 30″ diameter, directly mounted upon combined air and circulating pumps, each having 12″ steam cylinders, 10″ air cylinders, 10″ water cylinder and 12″ stroke, which running at 100 feet piston travel have a capacity of 400 gallons per minute each. In one boiler room we find at its forward end on each side a large vertical Blake duplex pump with two steam cylinders 12″ diameter, two water cylinders 7½″ and 12″ stroke. On the starboard side is the main feed pump which takes water from the tank feed pipe connecting with the feed tanks, and pumps it into the boilers at the rate of 500 gallons per minute. The one on the port side is the auxiliary feed pump, for while it has the same duty as the main feed pump, it has also valve box connections with sea, for supplying fire mains and flushing boilers, with main and secondary drains and bilge suctions and for emptying boilers. They can discharge either upward through feed pipes to outboard delivery or down through a bottom valve. They are placed in each boiler room and there are eight in all. In each boiler room are four large blowers, sixteen in all, used to force air into the fire room according to the closed stokehold forced draught principle. They are five feet diameter and 14″ wide at outlet driven by 5″ by 4″ double enclosed engines and are capable of delivering 25,000 cubic feet of air per minute with 4 oz. pressure and 650 revolutions, requiring about 37 I.H.P. each. They are, however, only expected to supply 240,000 cubic feet per minute altogether, under a pressure of one inch of waer. These as well as all other blowers in the ships are of the well known Sturtevant make.

On the platform deck forward we find there first two small double hoisting engines 4½″ by 4½″, located in the passing room in the midst of magazines, and used to hoist powder and shell to the gun deck. Aft of the magazines, and forward of the boiler space is the dynamo room or electric light plant. The ship has an installation of about 512 lights, 16 and 50 candle power, and search lights. The generating plant consists of two 32 kilowatt marine generators with attached dynamos of the General Electric Company's make, having a speed of 400 revolutions and supplying 400 amperes at a pressure of 80 volts. There are also two small electric fans 21″ by 5″. Aft of the engine room on platform deck are two ammunition hoists, similar in design and size to the forward ones. After this we come across the immense steering engine—a double cylinder horizontal engine 13″ diameter by 10″ stroke. It is geared to a very large screw, which works two nuts connected by rods to the secondary tiller which again turns the main tiller on the compound lever principle. This steering engine can be worked from below protective decks, from bridge deck, pilot house, conning tower and flying bridges.

On the protective deck we come across a variety of blowers. Two of them 4′ diameter stand at the head of the forward engine hatch, draw the hot and foul air out of the engine rooms and blow it up through the ventilators; capacity 9,000 cubic feet. The two donkey boiler rooms and the distilling room have each one blower about 3′ diameter and they are needed to keep the air fresh. About midships on each side are imbedded among the coal bunkers the ship's blower rooms, each containing two blowers, 4′ diameter and 15″ wide at the outlet, with 4″ by 3″ double enclosed engines capable of 600 revolutions and 10,000 cubic feet per minute at a pressure of 2 oz. They are the heart and pulse of the ship's ventilation. They draw through the main ducts and pipes with their hundred of arms reaching into every coal bunker, every magazine and every state room above and below. They draw the vitiated air out, or if necessary, can blow in fresh air. The two donkey boiler rooms have each two pumps, small duplex vertical 6″ by 4⅛″ by 7″, one a main feed pump, the other an auxiliary feed pump.

The distilling room is quite an interesting little museum of various steam pumps. One large horizontal, single cylinder, is a circulating pump for the distiller, taking water from sea valve at bottom and after forcing it through the distiller discharges into the head. This is a Davidson pump, 8″ by 9″ by 12″, capable of 260 gallons at 100 revolutions. Another pump has two water cylinders 2¼″ diameter, one steam cylinder 3½″ diameter and a common stroke of 4″. One end of this takes sea water from discharge of large pumps and feeds into the Baird evaporator. The other end takes the distilled water from the filters and delivers to the ship's tanks, and another small pump, single horizontal 3½″ by 2¼″ by 4″ takes the drain from the traps and delivers it to the feed tanks. There stands also the large wrecking pumps, whose sole duty is to pump from connection with the main drain, directly overboard, water collecting in the lower compartments, which the other pumps are unable to handle. It is a Blake horizontal single cylinder 10″ steam, 14″ water and 18″ stroke, and can at ordinary speed through its 8″ delivery pipe force 840 gallons per minute. To finish this deck, there is an upright engine for driving the machine tools in the engineer's workshop.

Going up to the gun deck forward our attention is first called to a mass of 20 tons of machinery, which we find to be a windlass of the American Ship Windlass Company's make, generally known as the Providence windlass. It is driven by two vertical engines with 12″ cylinder diameter and 14″ stroke, built for 2¼″ chain and 10,000 pound anchors. It also drives a capstan located on the upper deck. On this deck are also located the ash hoists which hang a few feet above deck on the boiler room and dividing bulkheads. They are double cylinder engines 4½″ by 4½″ with a drum and reversing gear. They are very neat and clever and can be worked from upper or gun deck from either side as required. Williamson Bros. are the makers of these as well as all other hoists and the steering engine. There are eight of these ash hoists. On the upper deck is only one engine and that is the Allen dense air ice machine. This consists of an air compresser 5¾″ diameter by 10″ stroke, which compresses air from 60 to 210 pounds and passes it into a cooler, which takes off the heat of compression, and thence into the expander, a regular cut off engine, where the air is admitted during part of the stroke, then cut off, and the air is expanded as the stroke is finished. During this expansion the air is cooled to a very

*Read before the Swedish Engineers' Club of Philadelphia by Fredrick Arsenius.

low temperature, practically 60° Fahr. below zero. The return stroke pushes this cold air through the pipes that encircle the refrigerating room and coils through the scuttle butt and is then returned to the machine to go through the same process over and over again. The steam cylinder for driving is 7″ diameter by 10″ stroke and uses 50 pounds steam. Above this deck is the bridge deck and there stands two deck hoists, 8″ by 8″ double cylinder reversible engines. This finishes the steam machinery with the exception of engines for small boats standing on this deck. They are fitted with very complete but diminutive marine engines of the compound type, but these nave, of course, their own steam generators. The 30-foot cutter has an engine 3½″ by 7″ by 6″ stroke and the 33-foot steam barge one 4″ by 7″ by 7″ stroke.

In addition to the steam machinery one capstan is worked by hand as are five 7″ Calkins' deck pumps that draw from principal compartments in the hold, the valve boxes and sea and delivers it to the fire main or discharges overboard. There is also one 5½″ force pump to supply sea water to baths, cisterns, etc., and one 3″ pump for fresh water service; a number of small hand pumps, hand steering gear and machinery for working the heavy guns.

Summing up we find: 39 steam pumps with sixty steam cylinders.

Twenty-six blowers or ventilating fans with 52 steam cylinders.

Three starting engines and three reversing engines with 9 steam cylinders.

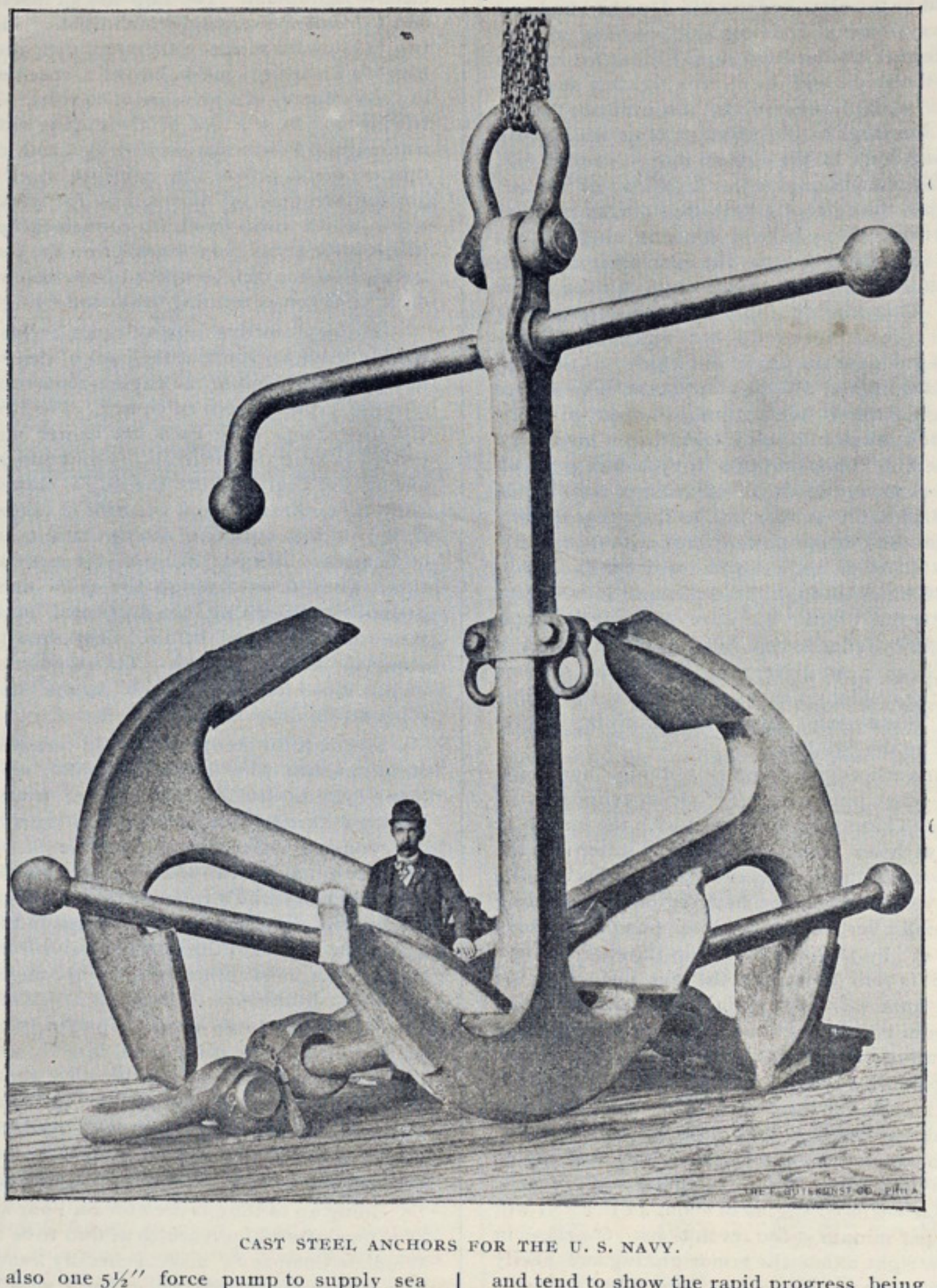
Eight ash hoists with 16 steam cylinders.

Four ammunition hoists, two deck hoists, one steering engine, one windlass, one shop, one air and two electric light engines, with 23 steam cylinders, making a total of 88 engines with 160 steam cylinders, outside and separate from the three main engines with their nine cylinders.

It takes, of course, a great deal of steam to run these auxiliary engines. From trial trips of U. S. S., Philadelphia and San Francisco I find that the auxiliary machinery took a little over 3 per cent. of the total I. H. P. and that proportion would give for this ship about 650 I. H. P. But they are not all run at the same time, and those running during the Columbia's trial trip took only about 600 I. H. P.. This did not include the ship's or engine room blowers, no hoists of any kind, no distilling room pumps, nor many others, so that if they were all working at the same time they would require 1,200 I. H. P., which is as much as it takes to drive a steamer 254′ by 35′ and 2,800 tons at a speed of 12.3 knots an hour. There are pumps enough to discharge 515,000 gallons or 193 tons of water per minute, and blowers enough to blow in or out 481,000 cubic feet of air per minute.

Anchors for the United States Government.

The cut of anchors shown herewith, represents the first cast steel anchors made from open hearth steel in this country. They were manufactured by the Penn Steel Casting and Machine Company of Chester, Pa.,



CAST STEEL ANCHORS FOR THE U. S. NAVY.

and tend to show the rapid progress being made in the manufacture of open hearth steel castings. The physical characteristics of these anchors, taken from specimens, show the following results, which have been taken from the United States government official records and are the average of the fourteen anchors which were made:

Tensile strain	63,599 pounds per square inch.
Elastic limit	35,153 " " " "
Elongation	27.29 per cent.
Reduction of area	34.43 "

The combined weight of these fourteen anchors is 173,410 pounds.

These are excellent specimens of the superior quality of metal which is manufactured at this plant, which is fitted with all the latest improved machinery and appliances for the successful manufacture of open hearth steel castings of any desired shape, from ten pounds in weight to fifty tons each. Their furnaces are of the Siemen's-Martin type, their anneal-

ing furnaces, drying ovens, gas producars, flasks and cranes being of the latest improved design. Their works are located on the Philadelphia & Reading Railroad at the foot of Penn street, Chester, Pa., along the Delaware river, adjacent to the Philadelphia, Wilmington & Baltimore Railroad, thus giving excellent facilities for shipping castings to all parts of the United States. The company has spared no outlay and has left nothing undone that would accomplish the best results in making it the largest, best and most completely established plant for the manufacture of steel castings in the country. It is composed of the best, skilled and experienced talent that can be had to take charge of the different departments. The company is managed by Frederick Baldt, who is widely known in the successful manufacture of steel castings and has produced some of the largest and most difficult castings, such as hollow shafts, stems, stern posts, struts, hawse-pipes and engine castings, used in the construction of large vessels at various ship yards, such as William Cramp & Sons Ship and Engine Building Company, Delaware River Iron Ship Building and Engine Works,Quintard Iron Works,Columbian Iron Works and Dry Dock Co., Bath Iron Works, Newport News Ship Building and Dry Dock Co., Samuel Moore and Sons Co., and the New York, Portsmouth and Norfolk navy yards. The castings were placed on the following vessels: Baltimore, Yorktown, Newark, Philadelphia, Vesuvius, New York, Bennington, Concord, Petrel, Maine, Texas, Miantonomah, Monadnock and others.

The best brands of melting stock are used, thus insuring open hearth steel castings, solid and uniform, easily machined without annealing, of great tensile strain and of a superior quality. This company has achieved unprecedented success in overcoming the difficulties encountered in the manufacture of difficult shapes, thus being able to compete with foreign establishments in the construction of heavy and powerful ordnance work for the United States government. Ship building plants are no longer obliged to go abroad for the steel required to build an effective navy.

The serious difficulty attending the making of irregularly shaped castings occasioned by the enormous shrinkage of cast steel has likewise been surmounted and the productions of this company can be used for all heavy parts of machinery, such as marine, stationary and blowing engines, cotton presses, steam hammers, equipment of rolling mills, thus yielding a great saving to the consumer where forgings have been previously used. Economy in weight gained by the superiority, strength and ductility of cast steel over cast iron will give four times more service. The first driving wheel centres for locomotives made by this company out of open hearth steel were 84 inches in diameter and used on one of the largest locomotives exhibited at the world's fair in Chicago. They manufacture by a quick process and have facilities to turn castings out promptly.

Regulations to Prevent Collisions.

Special Correspondence to the MARINE REVIEW.

WASHINGTON, D. C, April 26.—One of the most important results of the International Marine Conference at Washington in 1889 was a unanimous agreement by delegates from twenty-nine nations participating, upon an improved form of international regulations to prevent collisions at sea. It consisted of thirty-one articles and was enacted in its entirety by congress in 1890, with the proviso that it should not go actually into effect until proclaimed by the president. This proviso was inserted to allow time for other maritime nations to examine the proposed regulations. International correspondence on the subject shows that the condition of the fish-industry vary so much on the Mediterranean, the Baltic, North Seas, the Channel and off the Newfoundland banks that a uniform regulation for fishing vessels satisfactory to all has not been and probably can never be framed. Nearly every maritime nation wishes to frame its own regulations on this subject. Accordingly a bill to repeal the ninth article relating to fishing vessels was introduced in both branches of congress with the approval of the state and treasury departments and all the American delegates to the conference. This article is not in force itself, and as matters stand prevents the president from putting the rest of the act in force by proclamation after notice of say one year. As soon as this obstacle has been removed it is expected that other nations will adopt the new regulations, which in nearly every other respect have been approved by them, though not put in force for the reason named. So far as fishing vessels are concerned, the present regulations will continue in force.

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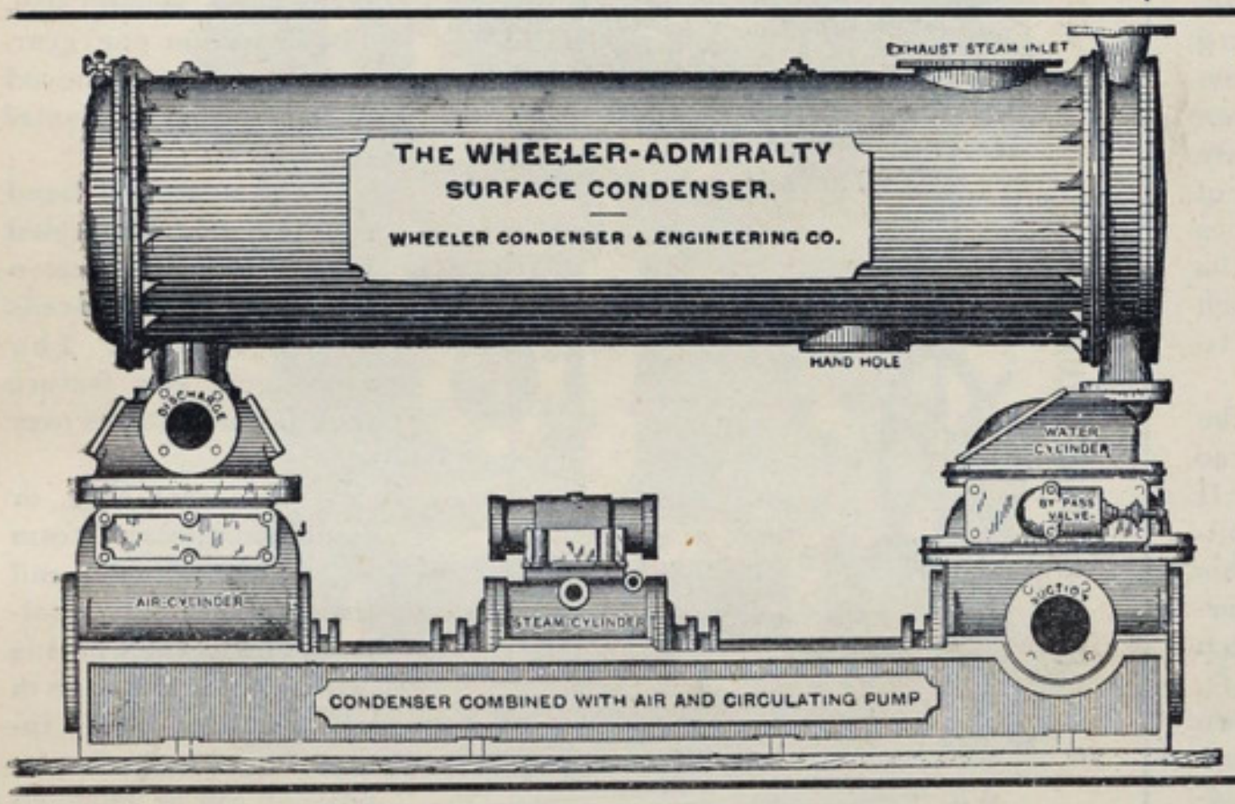

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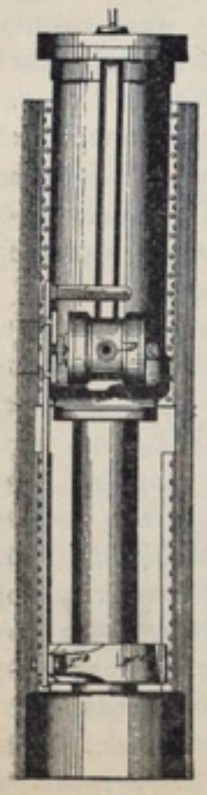

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TWO SIZES of these Hammers are made, one weighing 5000 lbs. and one 7000 lbs.

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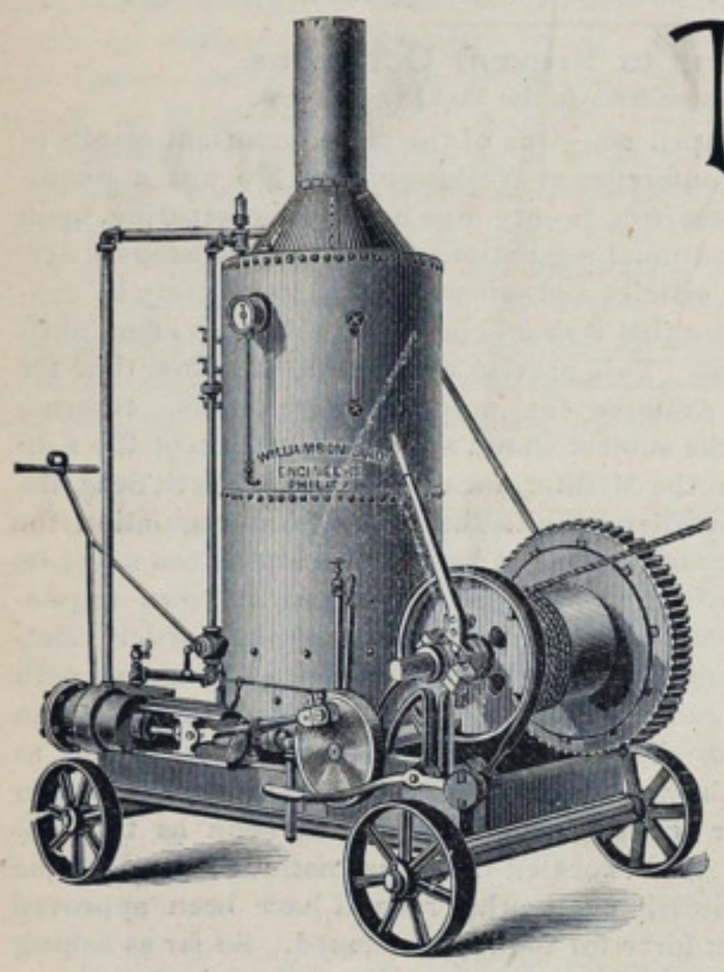
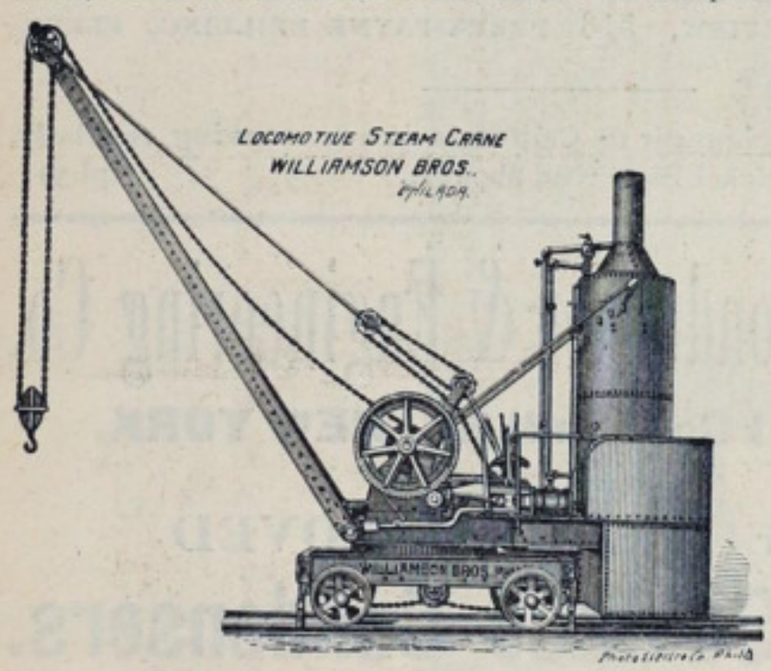


HORIZONTAL SPUR GEARET SINGLE DRUM HOISTING ENGINE.

THE establishment of Williamson Bros. was founded in 1866, and one cause of its success was the practical experience gained in the naval engineering service during the late war. In addition to this the best workmanship is put on each machine and everything is tested before it leaves the shop. As an evidence of the fact that they keep in advance of all improvements, it may be mentioned that they have been experimenting for some time with an electrical steering engine.

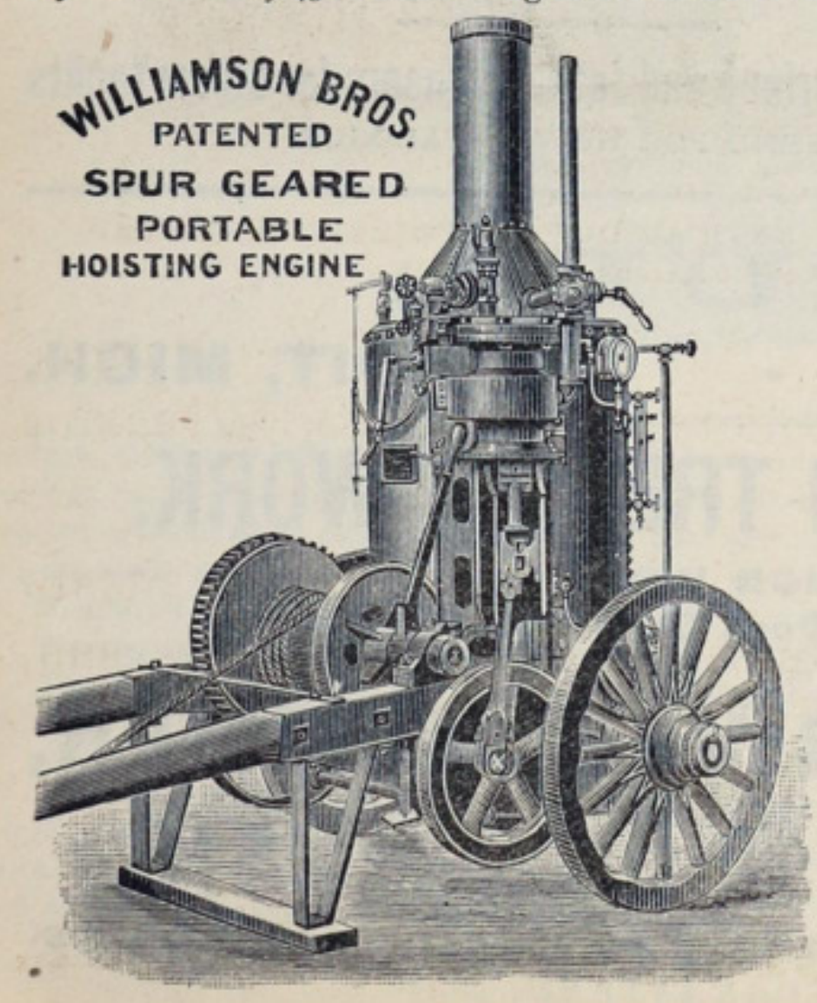
The boiler of the hoisting engine illustrated is of ample power, and the feed water is supplied by a pump driven from the eccentric on the engine crank shaft. A band fly wheel is fitted on opposite end of crank shaft, from which a belt can be run to drive a pump or other machinery.



LOCOMOTIVE STEAM CRANES.

The crane illustrated herewith is suitable for ship yards, docks, or decks of vessels. Its operation consists of hoisting, revolving, altering radius of jib and traveling by its own power. These motions are performed by a pair of direct acting engines set as shown in the engraving, one on each side, connected to same crank shaft.

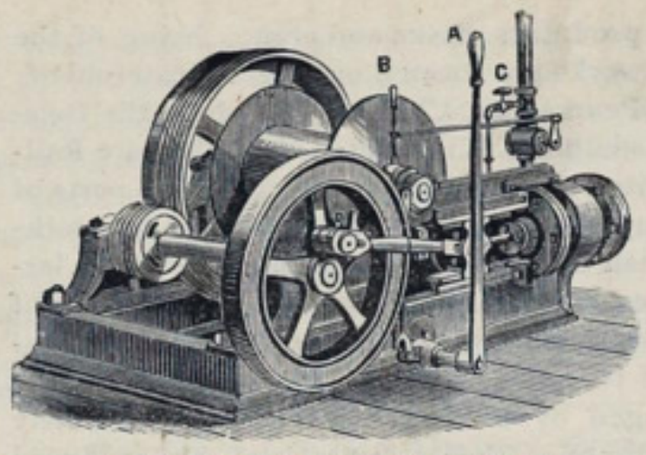
The wheels of the portable engine are 40 inches diameter. It is suitable for stevedores or contractors, and its convenience and durability is attested by 45 of them being in use on Philadelphia wharves. This style can be arranged with clutch on crank shaft, which is thrown into and out of contact with the pinion by a hand lever. The drum is keyed fast to the shaft with the large spur wheel, and is controlled by a strap brake operated by a foot lever.



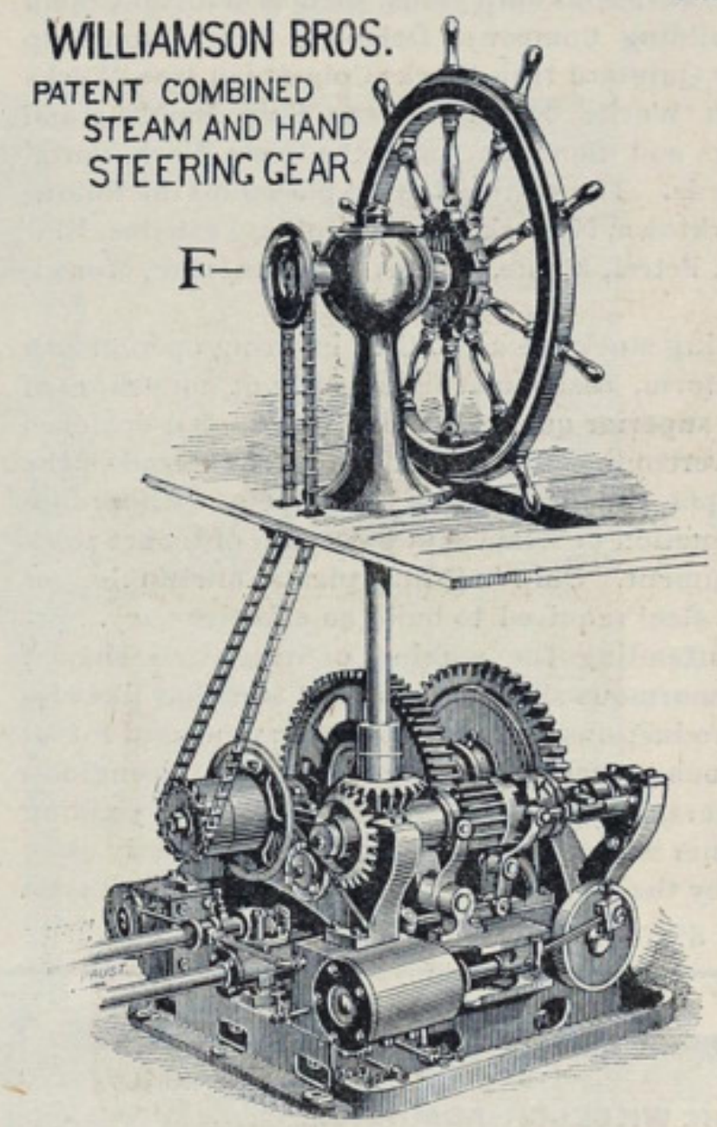
SPUR GEARED PORTABLE HOISTING ENGINE.

When the load is hoisted to the proper height, the engine is stopped, the brake applied to the drum, and clutch thrown out of contact; the load is then lowered by the brake operated by the foot lever.

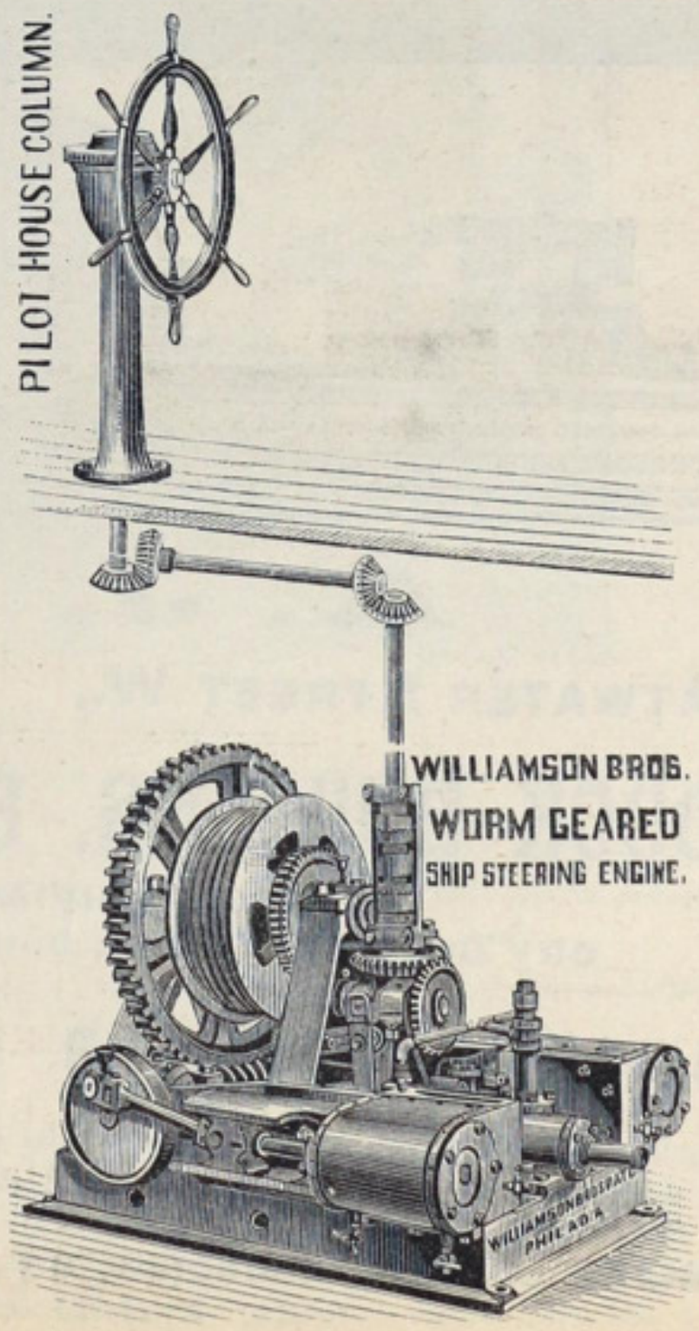
A relief valve is also fitted by



SINGLE DRUM DECK HOISTER.



STEAM AND HAND STEERING GEAR.



AUTOMATIC WORM GEARED STEERING ENGINE.

which the engine can be allowed to back down with a heavy load, without throwing out the clutch; which is often found to be very desirable with heavy loads, requiring careful handling, as with its use the engine always has the load under control, to lower, stop, or hoist at any point.

The illustrations in this column show the product of this well-known concern, which lake ship builders and vessel owners are familiar with. This is their deck and steering machinery. Nearly 150 of the best steamers on the lakes are furnishing with steam steering gears of the Williamson make, such concerns as the Detroit Dry Dock Company and other lake ship builders using them almost exclusively. They have given general satisfaction to owners, as well as captains and engineers.

The first illustration shows a single drum deck hoist. They are compact, with heavy cast iron box bed plate and are constructed throughout to guard against breakdowns. As coal and cargo hoisters they sustain their reputation after many years general use. They have no cog gear, and the deck is relieved of vibrations incidental thereto.

The steam and hand steering gear illustrated herewith is so well known on the lakes that it needs no description. The worm gear is a feature that has advantages over others.

The steam only, or combined hand and steam is always reliable, and that is a necessary quality. The worm wheel is fastened to the drum with bolts and holes interchangeable, so that its position can be changed to make it wear evenly. The worms are self lubricated by Winter's patent oiling attachment, which consists of a wheel revolving in a reservoir of oil and always in contact with the worm.

This style of cut gear has such large wearing surfaces and perfect lubrication, that it is preferable to the best spur gear, as was proven on the Pennsylvania R. R. Co.'s ferry boats, running between New York and Jersey City. Other particulars will be furnished by Williamson Bros., Richmond st., Philadelphia, Pa.

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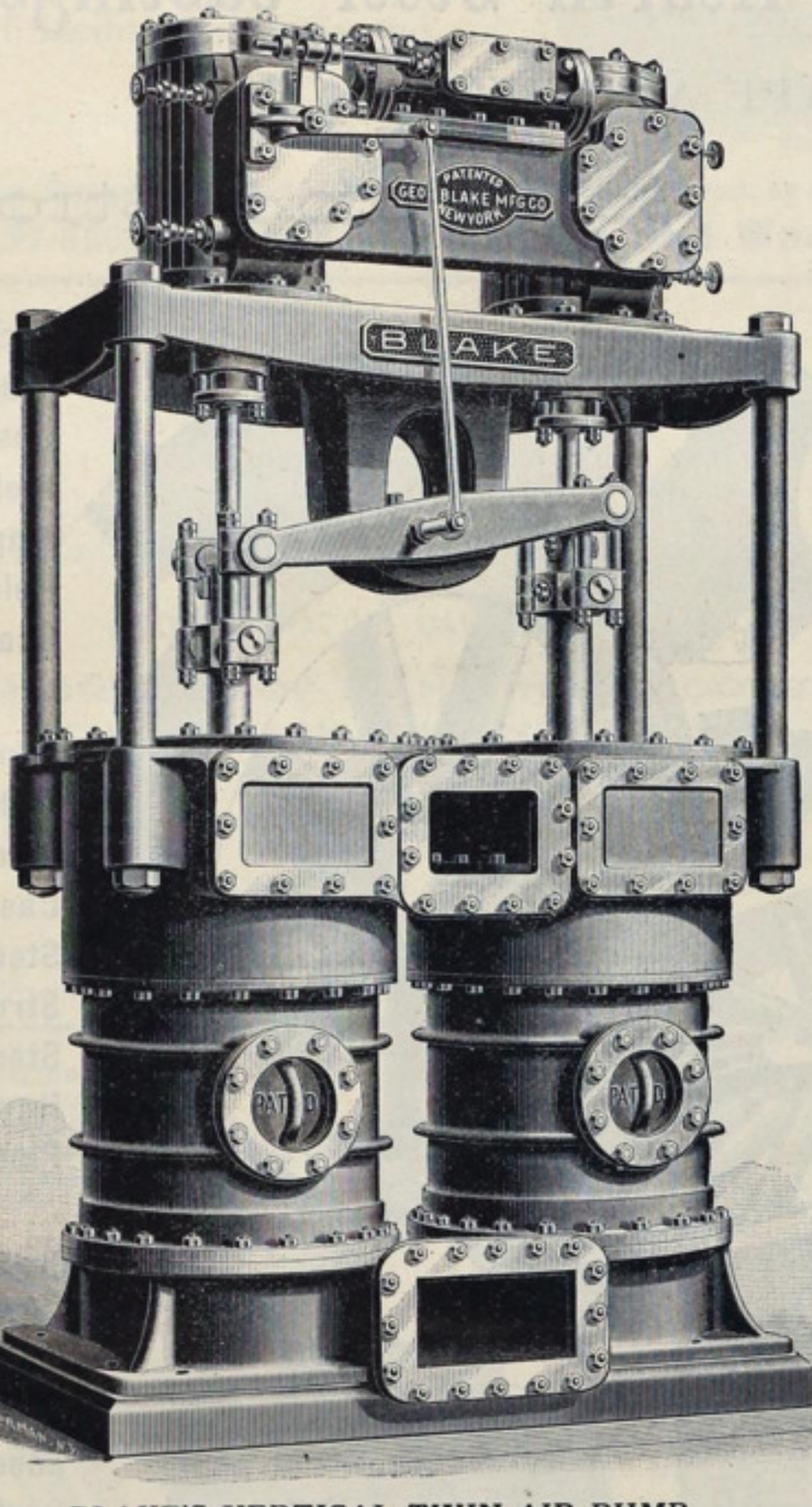

BLAKE'S VERTICAL TWIN AIR PUMP,
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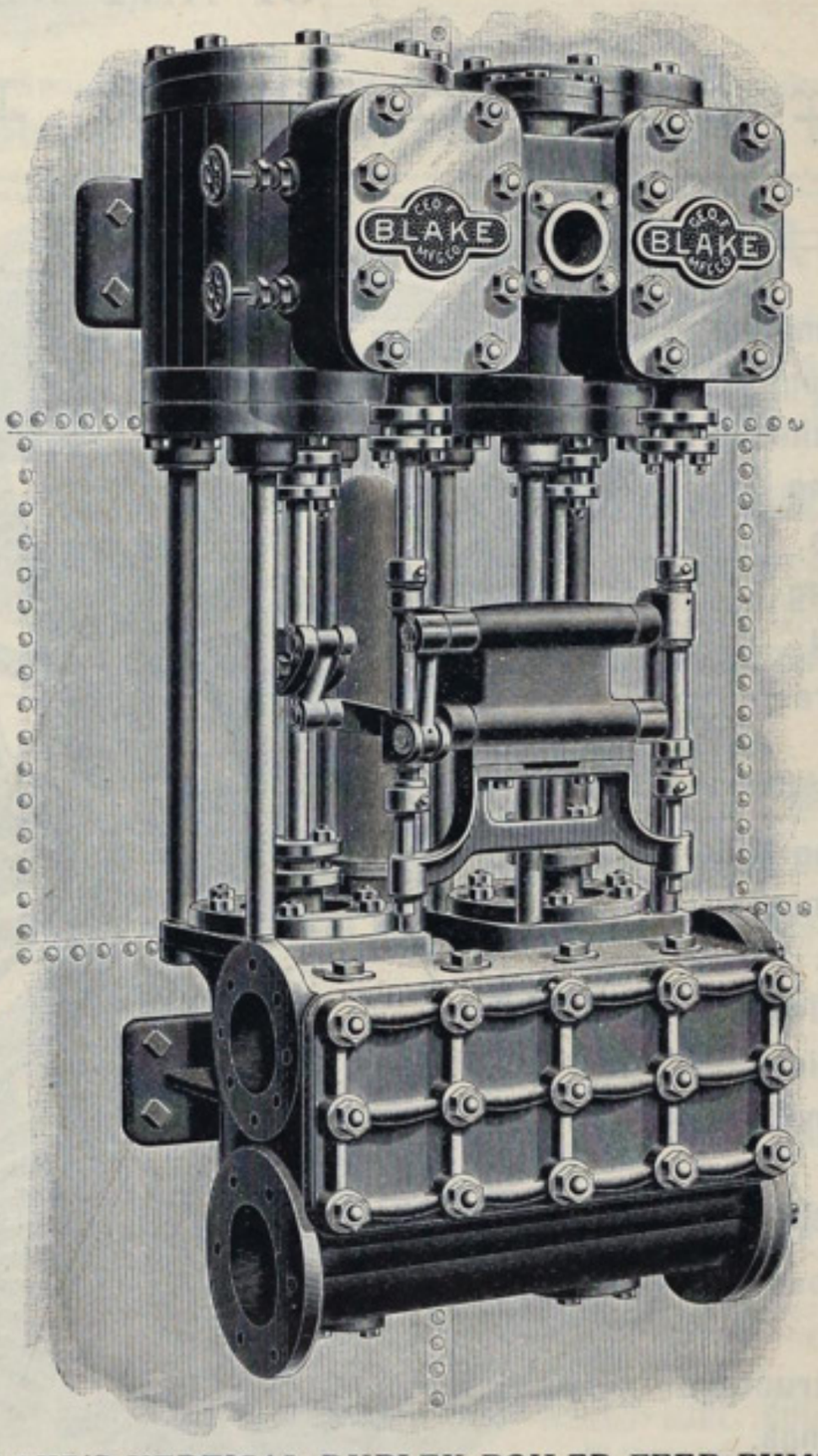

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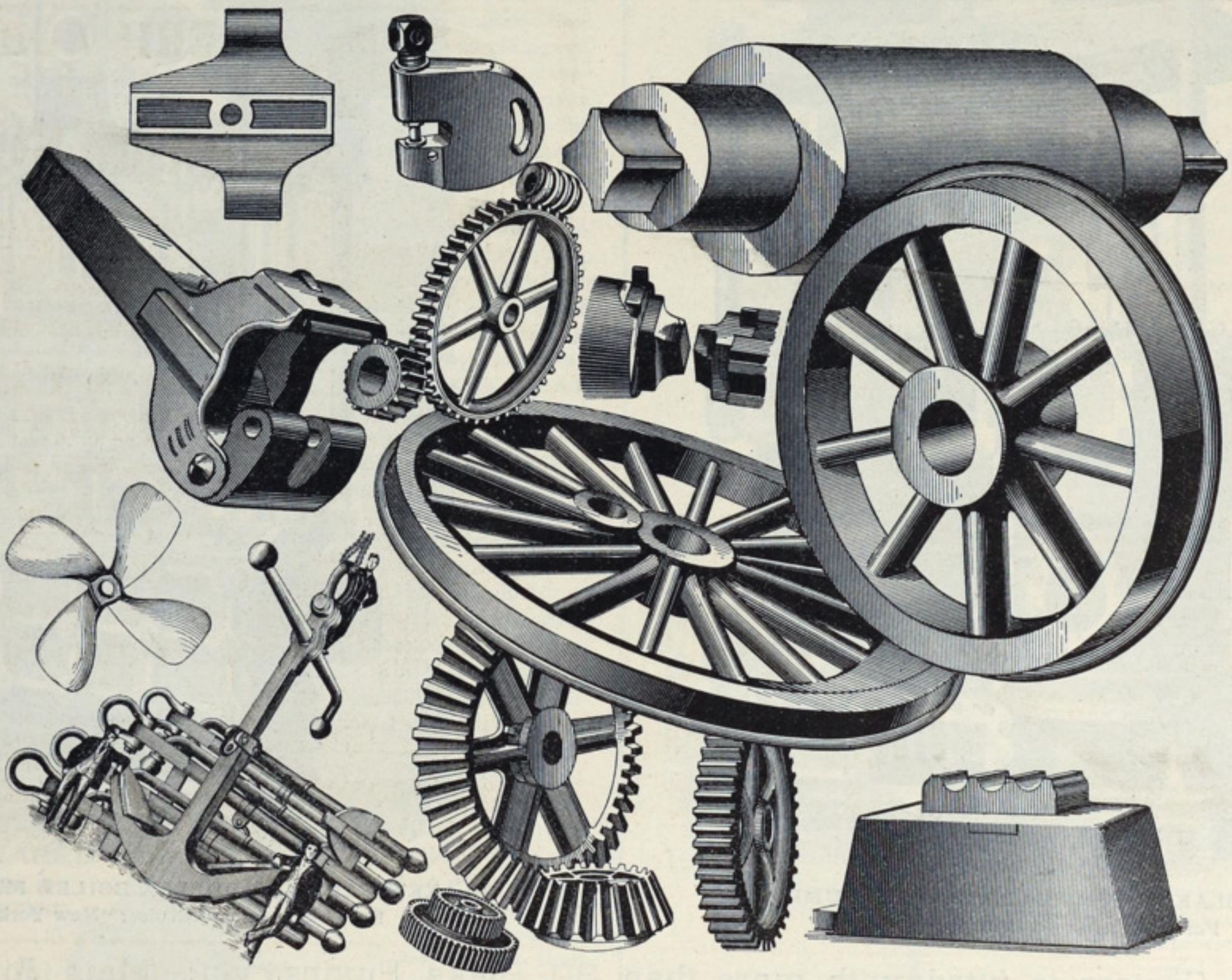

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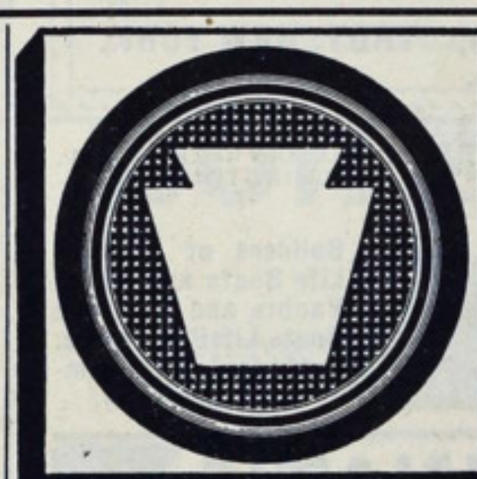

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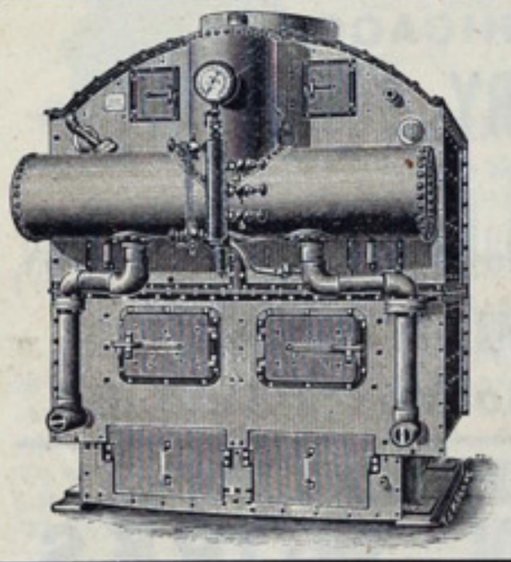

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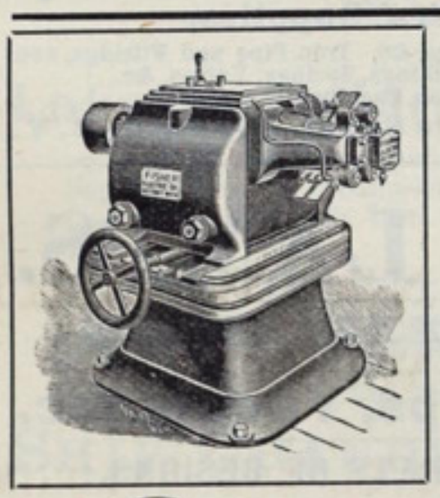

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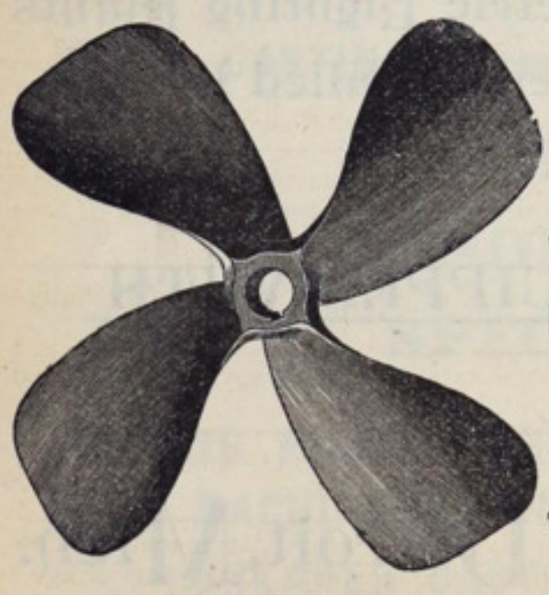

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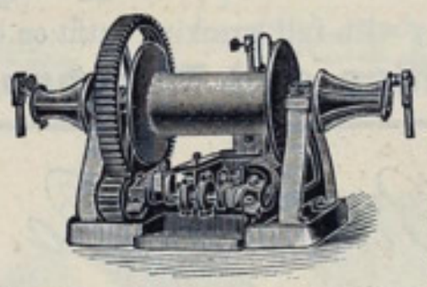

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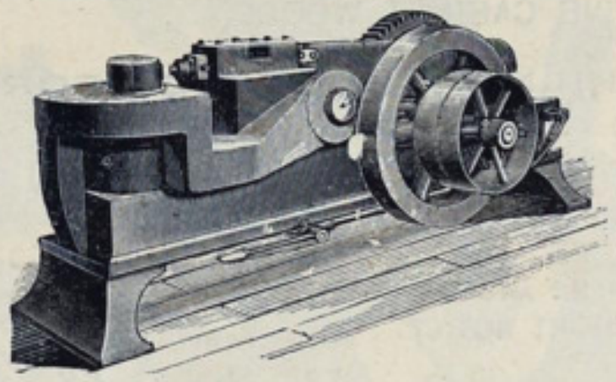

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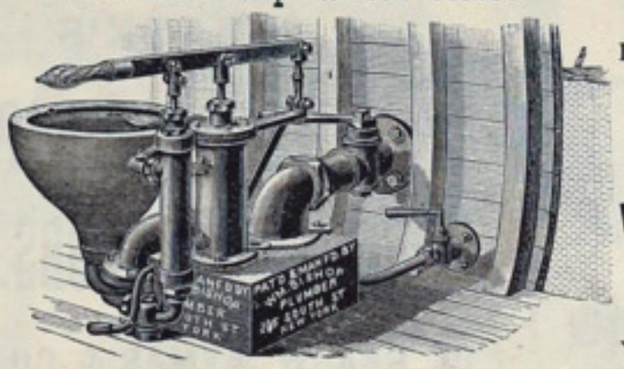

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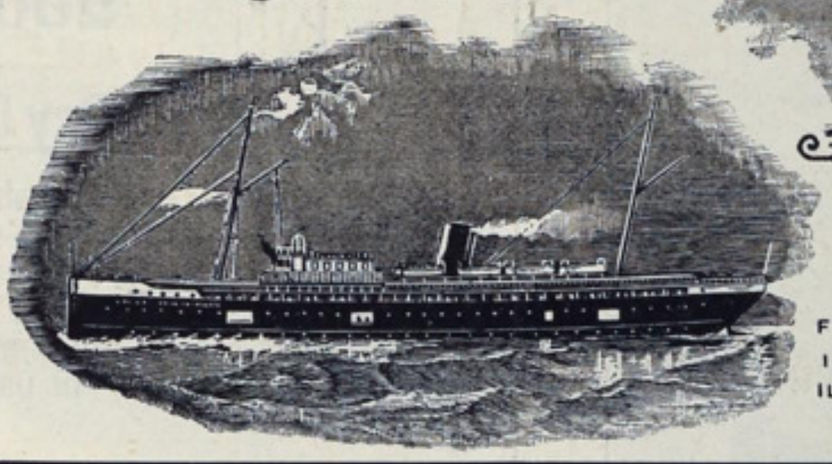

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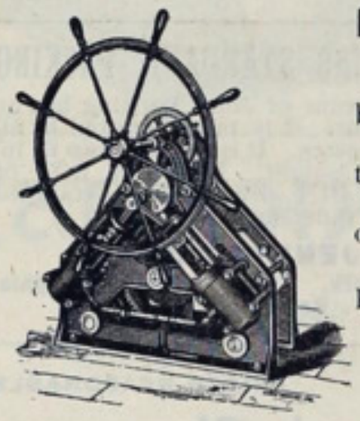

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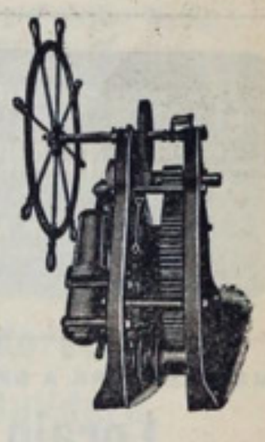

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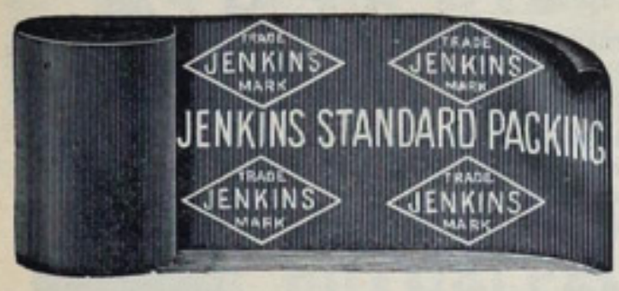

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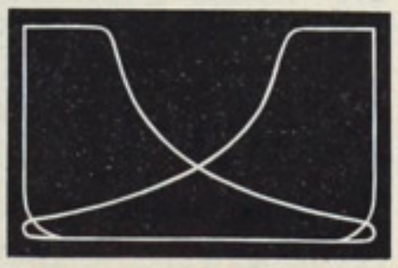

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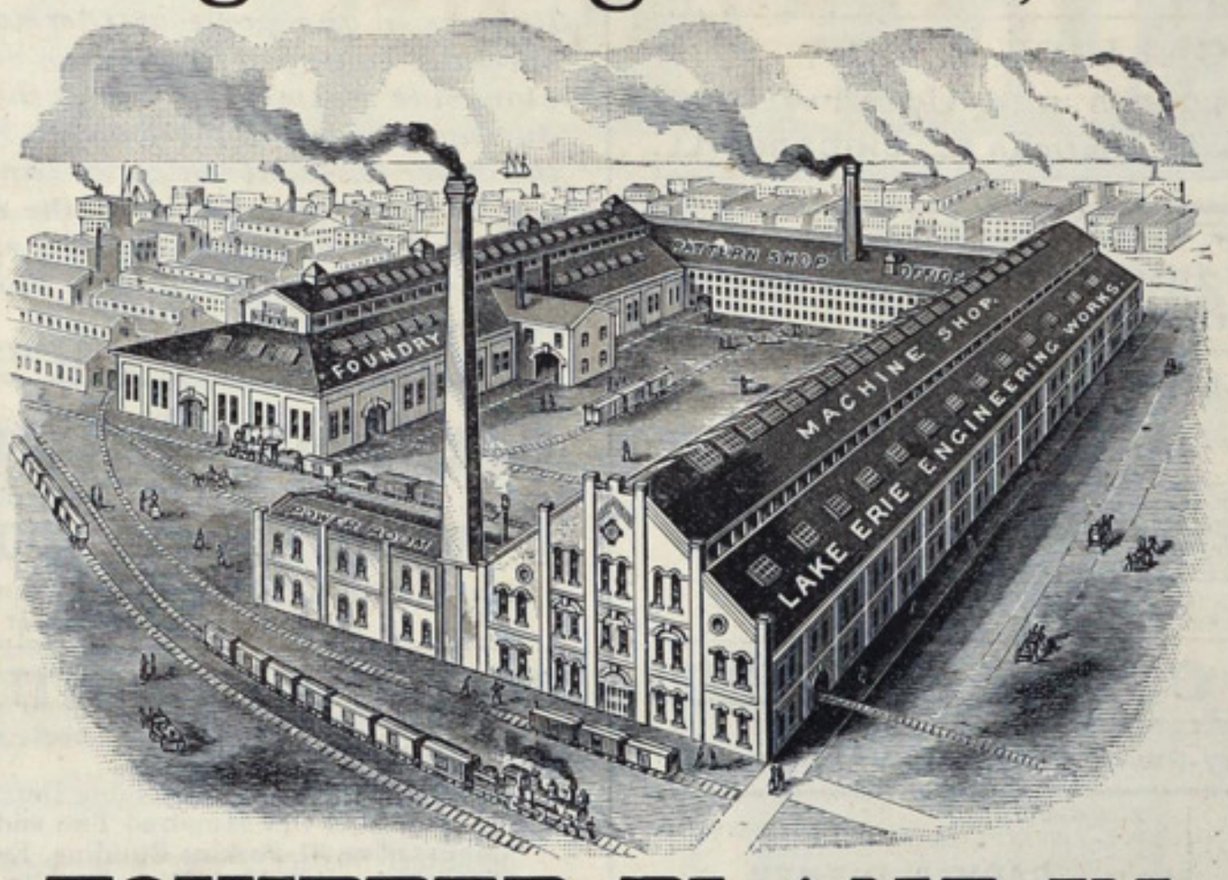

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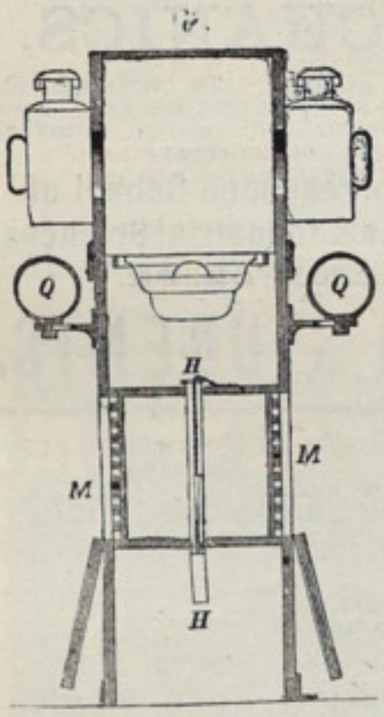

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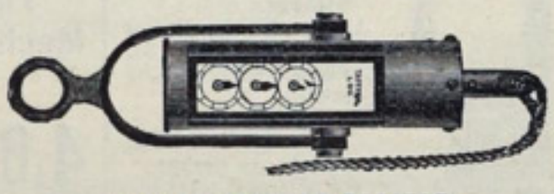

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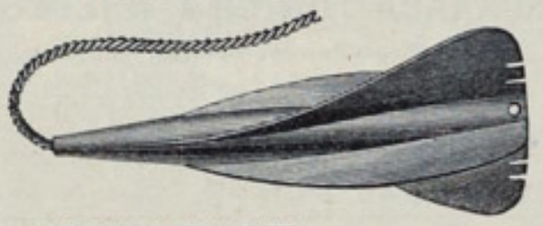

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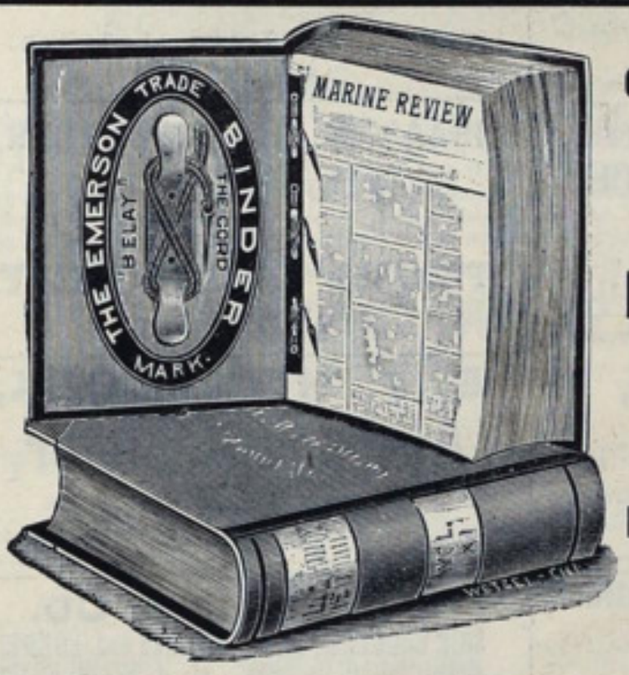

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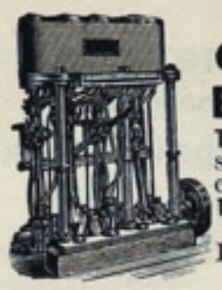

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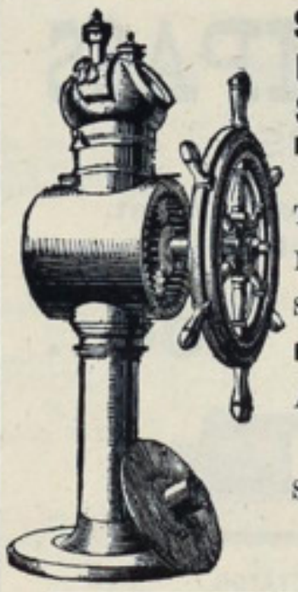

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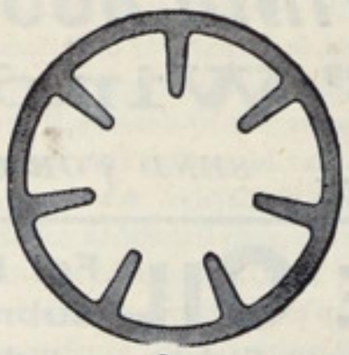

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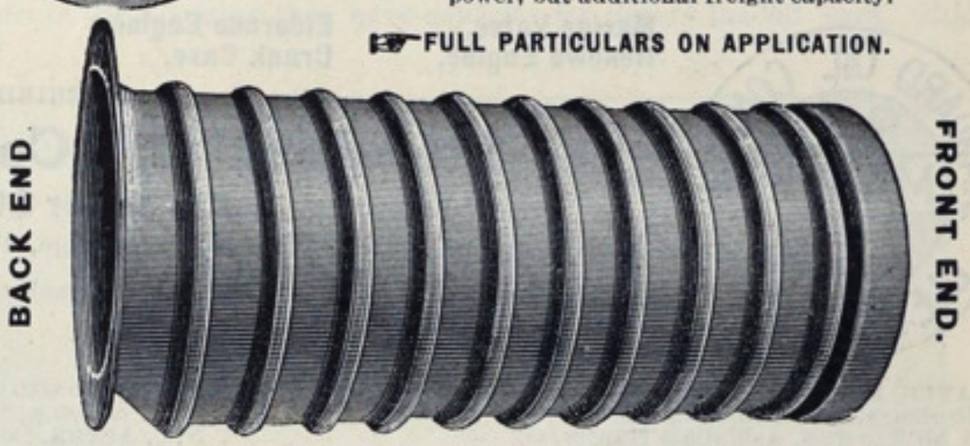

PURVES' RIBBED STEEL BOILER FURNACE FLUE.

With this style of Furnace Flue, all that has to be done to remove it is to cut out the rivets at the ends and slip it through the front; and to replace it, simply to slip it back in its place and rivet up the ends again without disturbing any other part of the boiler. No smith work is required to fit it in a boiler or to refit it when replaced. It is ready for use as it comes from the manufacturers. This style of flue has been in use six years without a single complaint.

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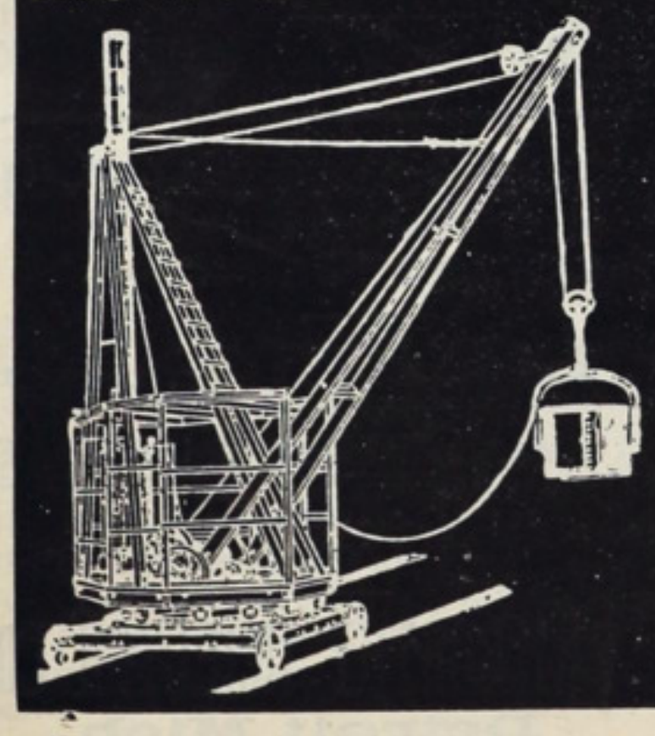

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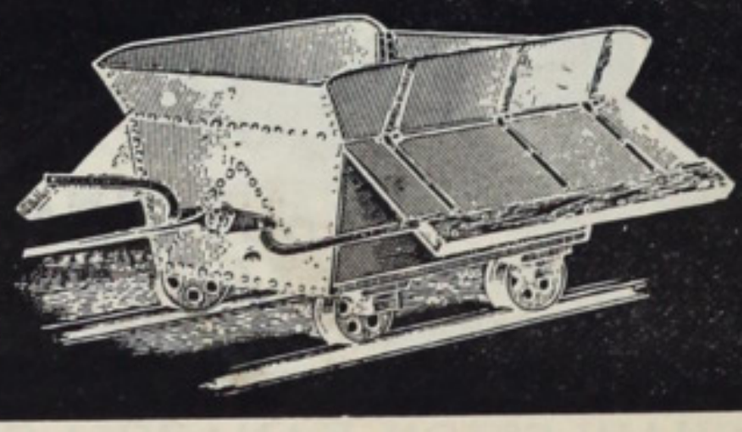

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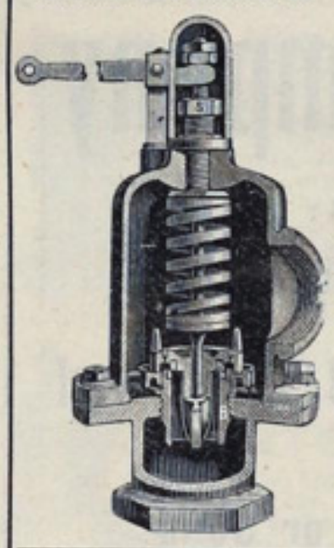

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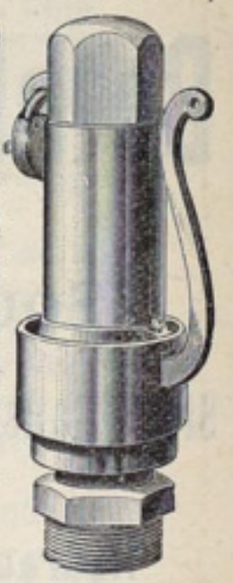

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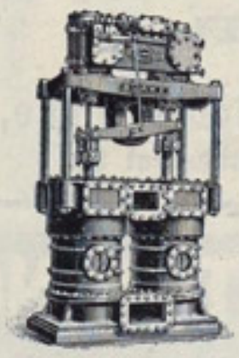

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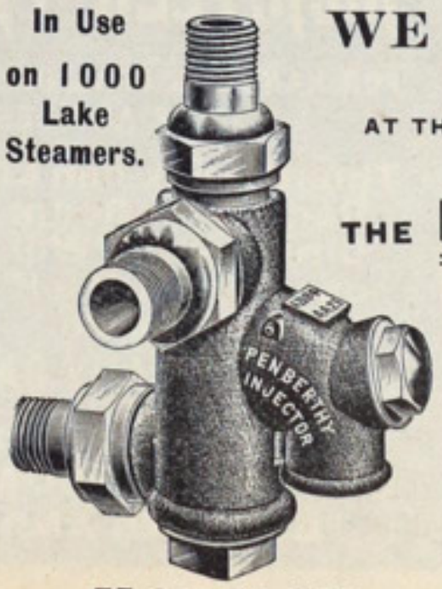

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